A CORPORATE FINANCIAL FORECASTING MODEL FOR FISHER CONTROLS COMPANY

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by

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CHAPTER I

INTRODUCTION

The past decade was marked by record-breaking growth rates in both sales and profits by most businesses in most industries. This rapid growth has been accompanied by changing conditions and operating complexities. The problems of how to cope with these growth effects caused management to search for new planning and control systems.

The growth in sales in this decade has not resulted in a corresponding growth in profits. As Chane points out, "in spite of sensational industrial growth, the specter of shrinking profit margins haunts top management. The need for greater profitability is the central issue confronting management today."[1] The pressure applied by the present trend requires a more effective method of dealing with greater risks, higher costs, more aggressive competition and other business factors to make the right decisions and select the most beneficial course of action in a short period of time.

To achieve this objective of "growth with profitability" a more effective planning and control system for business operations is even more critical than in the 1960's. This is pointed out by Hughes and Olson:

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[1]George W. Chane, "Modernize Your Organization for Maximum Profit," Financial Executive, (June, 1970), 38.

> The way in which most companies record and report the results of their operations has changed drastically in the last few years. However, there has not been a corresponding change in the financial planning function. And yet, it is the entire cycle of plans followed by results which feed back into more plans that is required for adequate financial planning.[1]

To meet this demand, some companies recently have been applying computer techniques to develop their growth projections and establish their profit plans. The computer enables management to establish planning models that can be used with ease to reflect changes and weigh alternatives for decision making. The models are a result of converting business projections "to a science, combining the mathematical accuracy of operations research and the data processing capacity of the computer."[2]

Fisher Controls Company has experienced the economic pendulum swings and the corresponding business effects. Profit planning has been a significant tool in the operation of the company and it is recognized that the planning and control function must keep pace with the changing times. By developing a financial forecasting model the company would be in a better position to look into the future and identify the business situations and better allocate the resources of the firm to the selected alternative rather than reacting only to past and current happenings.

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[1]Lyle F. Hughes and Charles A. Olson, "Computer-assisted Financial Planning," Management Accounting, (April, 1969), p. 24.

[2]Chane, op. cit., p. 44.

I. THE PROBLEM

Statement of the problem. The increasingly competitive environment of business coupled with changing economic conditions and the rapid changes occurring in every aspect of today's world make it imperative that management develop an effective profit planning and control system. The techniques to be used in the system may vary, but all of them must provide vehicles by which management can react faster to change, plan for longer periods of time and make decisions by evaluating alternatives that provide all the pertinent information. One such technique that has been applied in just the past several years and has not been fully exploited is the financial planning model. Computer applications enable the use of the model in revamping profit planning systems presently in existence; however, there are a variety of models and methods available and it is important that the correct model and approach be selected for the company that will be using it. For these reasons it is necessary to evaluate the present profit planning applications being used at Fisher Controls Company, examine specific model types and uses, construct a workable computerized financial forecasting model for the company and evaluate the effects on the revised profit planning system to assure its compatibility with the management style.

Importance of the study. Construction of a computerized financial planning model for Fisher Controls Company will enable management to better evaluate alternative courses of action and apply the resources

of the firm accordingly. With the restructured financial planning system the company will also be in a position to mechanize previously manual operations and update operating budgets and plans on a more frequent than once a year basis. The model will also provide evaluation, simulation and forecast data that has not been available in the past.

In general the importance of the study is to provide Fisher Controls Company with a total computerized profit planning and evaluation system. This will enable management to respond with timely decisions to economic, financial and profitability problems.

II. PURPOSE OF THE STUDY

The purpose of this study was to review the literature and examine models in the area of profit planning and financial model development. From this examination it was intended that the significant characteristics and types of models designed by various companies be characterized. The strengths, weaknesses, development problems and usage problems would also be reviewed.

An analysis of this information was then to be made to select the characteristics, type of model and design techniques for development of a computerized financial forecasting model for Fisher Controls Company. The final purpose was to develop, test and put the Fisher model into use.

III. PROCEDURES OF THE STUDY

The information collected for this study was secured by researching books, professional publications, and written documents provided by various companies. Also, personal interviews were conducted with individuals that have experience in the area of model development and profit planning techniques.

Detailed examinations of the internal operations of Fisher Controls Company were completed. This established factor relationships and correlations required to select and develop the financial forecasting model adopted.

Having developed the model, tests were undertaken to validate the accuracy, check the strengths and weaknesses and to modify as required. Three prior months were used for this purpose.

IV. LIMITATIONS OF THE STUDY

The significant limitation related to the project was the lack of actual models and detailed information presently in use by companies due to the relatively newness of model building. The approximately one hundred companies that are using models have tended to guard them with utmost secrecy. For this reason the information that is available on them is general in nature and lacks the definitiveness required for a thorough evaluation.

CHAPTER II

REVIEW OF THE LITERATURE AND EXAMINATION OF SELECTED MODELS DEVELOPED BY COMPANIES OTHER THAN FISHER CONTROLS

In order to develop a corporate financial forecasting model for Fisher Controls Company it is important to first review the literature that relates to model development. It is also necessary to evaluate the characteristics and types of models that have been developed and used by a selected number of companies.

The purpose of this chapter is to form the foundation for the type of model to be developed for Fisher Controls Company. This is accomplished through the examination of the literature available and by weighing the advantages and disadvantages of various types of models that have been developed and used by other companies.

I. REVIEW OF THE LITERATURE

Definition and origin of models. There are many ways that have been used to define a model. One concise definition was provided by the American Accounting Association:

> A model is a depiction of the relationships among the recognized factors in a particular situation; it emphasizes the key interrelationships and frequently omits some unimportant factors. Models

> have many forms and purposes: they may be descriptive or predictive; mathematical, physical or verbal; dynamic or static.[1]

Models exist in all businesses even though they may not be recognized as such. Most of these general framework models exist in manual form and not necessarily in a logical sequential step by step approach. The type and use tend to vary depending upon the area of application such as design engineering related to product development, production related to pilot plants or financial planning related to the development of budgets. These applications contain their own individual characteristics, but in practice could be related to a simple concept of a model as stated in a publication by Gershefski:

> A chess game can provide another view of the concept of a model. If, in addition to the board on which the game is being played, one of the players has another chess board set up beside him with the pieces in identical positions as in the real game, he could move the pieces to determine the outcome of various strategies in advance of his actual move. The chess set at his side would serve as a model of the real game.[2]

From a business and economic viewpoint a model can be viewed as a mere extension of the economic theory of the firm. Here the basic framework or model is the allocation of the firm's resources to generate the products or services for the consuming firms or individuals with the goal of maximizing profits. This general model is outlined on the following page.

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[1] Committee Report, "American Accounting Association Report on Managerial Decision Models," The Accounting Review, (1969), 44.

[2] George W. Gershefski, "The Development and Application of a Corporate Financial Model," Planning Executives Institute Research Series, (1968), 6.

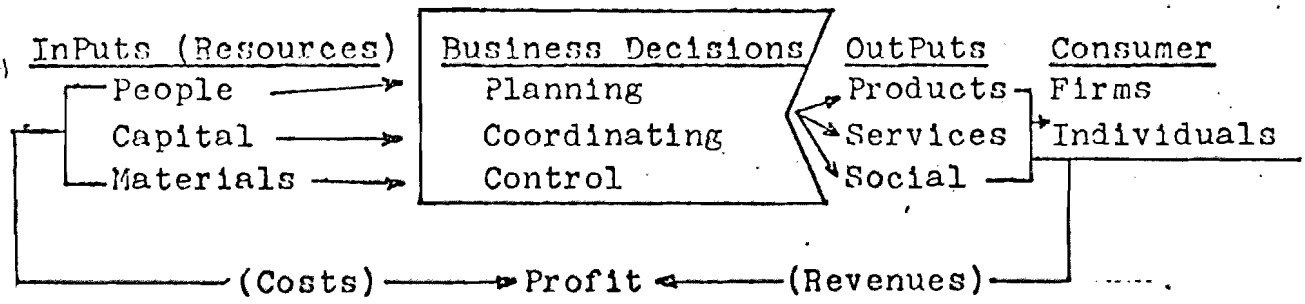

Figure 1. Graphical presentation of the economic theory of the firm depicting the model structure.

It is from this general framework of the economic theory of the firm that financial forecasting and planning models have emerged. The models, either manual or automated, are concerned with selecting the best alternatives in the use of the firm's resources in order to achieve optimum profitability. Advanced computer technology has further provided the vehicle by which this goal can be attained. However, a computerized corporate financial model "is a relatively new management tool that originated in the mid-1950's, but was not significantly applied until 1966."[1] The history of the computer models is further explored by Gershefski:

> By the early 1960's operations research models had reached the stage of development where they were being applied to some of the basic operations of a company such as inventory management, scheduling and resource allocation.
>
> During the past several years model development made such impressive strides that it was feasible to think in terms of modeling the corporation as a whole and interest began to focus on corporate modeling.[2]

By the end of 1969 many companies had began to develop corporate models; however, there were only approximately one hundred models in use or under development by that time.[3] As a result, model building is still a new management tool and detailed information pertaining to specific

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[1]Albert N. Schrieber, Preface to Corporate Simulation Models (Seattle, Washington: University of Washington Printing Plant, 1970), /n.p./.

[2]George W. Gershefski, "Corporate Models the State of the Art," Managerial Planning, (November-December, 1969), 1.

[3]Ibid.

models in use is closely guarded by the companies using them. This is partially explained by comments made by representatives of several companies who stated that as much as four million dollars and six years[1] had been invested in model building.

Types and characteristics of models. The determination of model types is not as well defined as it may appear. One method of categorizing model types is as either computer oriented or manually derived. The computer oriented model is the one of primary interest because of its flexibility and the short reaction time involved.

Models could also be grouped as descriptive or predictive; as mathematical, physical or verbal; or as Farag has described them:

> There are three pure types of models: iconic, analog and symbolic. An iconic model "looks like" the object it represents, such as a model of the atom (scaled up). An analog model substitutes one property for another. The problem is solved in the substituted state and finally the solution is translated back to the original dimensions or properties. An excellent illustration of an analog model is the slide rule in which the physical property measured is represented by lengths along a logarithmic scale. Symbolic or mathematical models are by far the most important type of models. This is only natural since they are the most abstract and hence the most general. In these models a symbol, such as y or x represents a quantity such as profit or cost. Moreover, mathematical models may be classified into probabilistic and deterministic groups according to whether they involve uncertainty or the absence of it respectively.[2]

The symbolic or mathematical model is the type of model that has the most appeal in developing a financial forecasting model for

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[1]George Frazier, Boise Cascade Corporation, telephone conversation, November 24, 1970.

[2]Shawki M. Farag, "A Planning Model for the Divisionalized Enterprise," The Accounting Review, (April, 1969), 312-13.

most businesses. From the types discussed, the computerized mathematical model provides the most advantages.

Within the mathematical category there are two basic groups or types. The first is subjective in nature and requires generalizations pertaining to volumes, costs and growth rates.[1] It can be classified as a simulation case study model that compiles the forecasts of individuals involved into an overall model for the company. The second type of mathematical model is referred to as an optimization model which becomes an alternative selector rather than just a tester of alternatives.

The generally accepted model being used by most businesses today would be described as a computerized mathematical simulation model. Optimization techniques are, however, becoming more prevalent than previously and more work is being directed to them by more and more companies.[2]

Model types are further classified by detailed function. These functions relate to inventory, queuing, capital budgeting and others. Even within these functional groupings, there exists another list of model types. For example within the capital budgeting area there is the IBM Model, the Mattessich Model, the Lutz Model, the Weingartner

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[1]R. M. Black, "Historical Development of Finmo," Professional Report, (October 27, 1969), 5.

[2]Gary W. Dickson, John J. Mauriel, John C. Anderson, "Computer Assisted Planning Models: A Functional Analysis," Corporate Simulation Models, (1970), 59.

Model and a host of others.[1]

There are viewpoints as to the correct groupings of model types, but generally, the selection must be made based upon the required use by the individual concerned. In the most part the various types become sub-categories of a major category.

Reviewing the types of models in use and their characteristics reveals that 95 percent are of a case study simulation type and only 5 percent are optimization models. Ninety-four percent of the models are computerized.[2]

In a study of twenty models presently in use[3] the following additional characteristics were prevalent:

1. Financial statements are projected by the models and predominantly represent the output. Exception reporting for the most part is not included in the models. Because the models are of a case study nature, comparisons of output data between cases is not made by the computer, but by the user on a manual basis.
2. The models were all deterministic and generally simulation in nature. This would classify them as case study models. These models employed computer techniques to provide simulation of input data. Within this realm there are two distinct model structures. One is a general, more flexible in nature, model

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[1]Hollis M. Black, "Mathematical Models Applied to Capital Budgeting," Professional Report, (November 20, 1966), 62-67.

[2]Gershefski, op. cit., p. 6.

[3]Dickson, Mauriel and Anderson, op. cit., pp. 49-68.

which permits the use of a range of variables. The second structure is more fixed in nature which requires the use of fixed output reports and a limited set of options relating to use of values for the variables. The use between the two structures is mixed; however, the future trend is expected to be in the direction of the first.

3. Optimization models are still in very limited use and companies are using case study simulation techniques more widely. There is, however, an indication that optimizing techniques and models will become more significant as developments in the area are recognized.

4. The models tend to view the corporation in general from the "top down," which includes only the inputs from top management, as compared to viewing the corporation in detail by functional area from a "bottom up" approach in which each level of management provides inputs.

Models tend to be a representation of the general operation of the firm with separate models established for more detailed over-views of business segments such as inventory control, cost accounting and budgeting. The direction of the models and characteristics is for the consolidation of the more specific models into an overall corporate financial planning model.

Use and application of models. Because of the advantages provided by computer technology, models have a wide variety of uses. The general use by management is in coordinating the complex interactions of all areas

within the firm to improve overall planning and forecasting. In a survey conducted of 323 business firms Gershefski summarized eleven uses mentioned by management and the number of times each was mentioned as indicated in Table I.

TABLE I

SUMMARY OF USES OF CORPORATE MODELS
AS SURVEYED BY GERSHEFSKI [1]

Number	Description of the Use	Number of Times Mentioned
1.	Evaluate alternative operating or investment strategies	30
2.	Provide revised financial projections rapidly	22
3.	Assist in determining feasible corporate goals	20
4.	Analyze the effect of interacting items	20
5.	Determine sensitivity of earnings to internal factors	17
6.	Develop a documented projection of financial position	16
7.	Allow management to consider more variables when planning	16
8.	Determine the need for long term debt	8
9.	Validate manually prepared projections and existing procedures	8
10.	Develop a corporate data base or information system	8
11.	Assist in the evaluation of capital investment proposals	5

[1] George W. Gershefski, "Corporate Models the State of the Art," Managerial Planning, (November-December, 1969), p. 5.

The first use, that of evaluating operating or investment strategies, is highly important due to risks in capital outlays and in investments. A model is capable of projecting the financial results on a year by year consolidated basis both with and without the investment for any number of evaluation methods. The comparison provides an alternative approach to decision making.

Updated financial forecasts or budgets can be generated with relative ease in time and effort. The computer model enables management to overcome the disadvantage of manual projections or budgets being out-of-date as soon as they are prepared.

The model also enables management to establish corporate goals that represent coordinated efforts of all functional areas. These coordinated goals further represent reasonable targets due to the ability of management to make decisions by weighing alternatives produced by the model.

Other uses involve some varied form of those listed in Table I; however, one significant implication, either planned or unplanned, is the application of the firm's limited resources. These resources must be employed in the direction that results in profit maximization for the firm in order to meet the challenges of competition, new technologies, rapid obsolescence, new products and other changing trends in today's economy.

Advantages and disadvantages of models. The advantages offered by computer models are directly related to the uses of the models. One advantage is the models' ability to produce output information in a short

period of time at a relatively low cost. This enables management to evaluate alternatives by testing the results of a number of case studies projected by the computer. The effects on corporate growth and profitability can be determined.

Kimball describes a second advantage:

> Explicit statements of the assumptions underlying the model and a clear definition of how the important variables in the model interact provide a common basis for understanding and communication between all those involved in the planning process. Future planning teams will benefit from knowing the assumptions under which predecessor teams worked.[1]

The communication aspect is an aid to the establishment of corporate objectives and assurance that all departments are striving for coordinated objectives. Also, this aspect of models tends to establish a single centralized information system. If a segment of information is missing or inaccurate, the model will indicate where the weakness in the planning system exists.

Third, "a well-constructed model can account for up to fifty variables, sometimes more. At best, the human mind can grasp the relationship of three or four."[2] The factors that should change when making evaluations can be changed automatically. This enables sensitivity studies to be made relating the effects each variable or combination of variables has on the others and on the profitability of the firm.

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[1]William L. Kimball, "Planning with Mathematical Models," Budgeting, (March-April, 1969), 14.

[2]Chane, loc. cit.

A fourth advantage is that models using computer applications are established by programs following a step by step documented procedure. This eliminates ambiguity in the calculation and use of input data resulting in consistent output data.

The fifth advantage is the model's capability to prepare long range profit plans. This enables management to view short range budgets and plans in terms of their long range profit effects.

Lastly, most important is the advantage of being able to evaluate probable results before the real action takes place. The risky speculation in business decisions is thereby reduced by use of sound mathematical predictions.

Associated with most advantages are some disadvantages. The first disadvantage is that models can not reproduce the real world and that the model is no better than the assumptions used to develop it. In this regard the danger exists that a problem may be drastically oversimplified causing inaccurate decision making from use of the model. Another view is that the model merely gives respectability to the same set of data and decreases flexibility and initiative of the decision maker.

A second disadvantage is the length of time required to build a model. The length of time has ranged from five months to twenty-five man years by companies that have developed corporate models. This disadvantage is basically a cost versus benefit problem and requires separate evaluation by management on a case by case basis. If the model will not return at least the dollar amount invested or produce

more efficient outputs than previously, the time and cost should not be directed toward development of the model. However, even with an adequate return, the development time disadvantage often results in obsolescence of the model prior to its completion or the need for updating and/or revision.

Generally, the disadvantages of corporate models are minimal if the models are well defined and are recognized as being only a tool available to management in planning for the future. However, the models are worthless if they are only developed but not used.

Development of models. Although the approach and sequence of events in developing models will vary from company to company, there are several basic considerations important to model building. The more important considerations are reviewed.

One of the first considerations is that the models be simple, but general enough to include the entire business. Kami stated it in this manner:

> They should not be so sophisticated they embrace only one part of the business. It's no use having the most fantastically efficient left-side panel fabrication in Oshkosh if the rest of the corporation goes to pot. So what we need in the models is not regression analysis or partial differential equations, but we need addition and subtraction and maybe multiplication. Please don't divide, it confuses people. Don't use semilog paper, because that takes an awful lot of explaining to top management.[1]

Kami's comment is somewhat sarcastic, but yet relevant to the development of models. His comment falls under the category of determining

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[1]Michael J. Kami, "Planning: Realities Versus Theory," Management Thinking, (January, 1968), 11.

the basic structure of the model. Also, to be included as part of the consideration are the equations to be used in the model.

There are generally six basic steps, including the one above, related to building models.[1]

1. A feasibility study must be established to define the models' applications and to define the general approach to be taken.
2. The basic structure of the model is set and the necessary equations are developed.
3. Computer applications must be identified which includes coding, testing and coordination.
4. The model must be tested for accuracy and output requirements.
5. Management must review the model and its functions.
6. Continual updating, revising and review of the model must be undertaken to assure its effectiveness.

More specific considerations tend to fall within one of the above six general categories. However, another important point is that top-down planning environment requires a top-down model and a bottom-up model will not work efficiently in this situation.

Another key factor is that a general model be put into operation as quickly as possible and build on it after it is in use. This assures that the model gets off the ground and exposes its use and application to management in a short period of time.

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[1]Gershefski, "The Development and Application of a Corporate Financial Model," p. 5.

Techniques and tools used in models. Companies have applied a variety of techniques and tools in model usage. Several of the techniques are described briefly below.

Linear programming is one such technique. It is usually applied to optimization models where the goal is to select the best alternative. As an example, linear programming analysis could be used to enable management to maximize profit contribution between three products by designing a production program for optimum use of machine processing.[1] This technique is not commonly used in corporate financial forecasting models because of its complexity, however, it is expected that it will become more characteristic in models in the future.

Another technique is regression analysis. Regression is defined as "a line which shows how the mean of one variable is associated with given values of another variable."[2] Regression analysis is the process used in identifying the line and its significance. Multiple regression analysis is used when more than two variables are involved. Because of the nature of models, many variables are usually involved and interrelationships must be established between them. This has been a very important and prevalent tool used by companies in developing working models.

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[1]Stewart D. H. Thomas, "Management Planning and Control of Systems," Managerial Planning, (July-August, 1970), 2.

[2]Hugh E. Bradley, "Setting and Controlling Budgets with Regression Analysis," Management Accounting, (November, 1969), 31.

Sensitivity analysis has been of great value to model users. It involves running a model under different conditions to evaluate the effects of the changes related to different market growth rates, changes in costs or selling prices, and other factors.[1] This type of analysis provides management with knowledge of effects that a change in one variable has on the other variables and the outputs of the model.

Game theory: decision trees, PERT (program evaluation and review techniques), queuing theory, correlation analysis, nonlinear programming, probability theory and acceptance sampling are other examples of the tools and techniques available to management in developing and using models more efficiently. The use of these techniques tends to vary from company to company.

II. EXAMINATION OF SELECTED MODELS DEVELOPED BY COMPANIES OTHER THAN FISHER CONTROLS

This section provides a selected summary of models that either have been or presently are in use by different companies in various industries. Two known polls have been taken and several symposiums have been held that examined the extent to which models were being used and the model types. In one survey by Gershefski the following key facts were indicated.[2]

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[1]Kimball, op. cit., p. 17.

[2]Gershefski, "The Development and Application of a Corporate Financial Model," p. 2.

Approximately one hundred models were to have been in use by the end of 1970 with over one-half of them being developed in 1969 and 85 percent since 1965. This survey indicated the newness of model development in the United States. A summary of these models by industrial grouping is reflected in Table II.

TABLE II

INDUSTRIES USING MODELS OR PLANNING TO DEVELOP MODELS BY 1969 YEAR - END[1]

Industry	Number of Companies Responding	Number with or Developing a Model	Percentage with a Model
Office and Business Equipment	8	5	63
Banking	18	11	61
Electric and Gas Utilities	28	16	57
Petroleum	15	8	53
Chemical	15	7	47
Radio, Television, Electrical Manufacturing	7	3	43
Services	12	5	42
Insurance	10	4	40
Cosmetic Manufacturing	5	2	40
Miscellaneous Metal Working	12	4	33
Aircraft Manufacturing	18	6	33
Telephone Companies	11	6	27
Paper	15	4	27
Retail and Wholesale Trade	13	3	23
Manufacturing	52	11	21
Food Processing	22	4	18
Apparel and Textile	6	1	17
Raw Material Production	28	4	14
Printing and Publishing	16	1	6
Drugs	12	0	0
Total	323	102	31%

[1] George W. Gershefski, "Corporate Models the State of the Art," Managerial Planning, (November-December, 1969), p. 2.

The companies varied in size and most other characteristics. Most companies had developed formal planning prior to undertaking model building; however, there were several exceptions to this characteristic also.

An examination of several models that have been developed by other companies was made. The characteristics and other information related to those models that have been examined are included below.

MONSANTO COMPANY MODEL[1]

Monsanto Company developed a corporate financial planning model in 1969. The model was developed in approximately six to seven man-months at a cost of $17,000. The Business and Analysis Group of Corporate Accounting of the Monsanto Company developed the model to provide management with a fast, efficient method of reviewing financial alternatives for decision-making purposes. Specifically, the model provided Monsanto management with: (1) a long-range view by using projected trends and current business philosophy, and (2) the ability to test and display a large number of alternative long-term strategies. These situations enabled management to evaluate questions regarding working capital and other financial data.

The model was constructed to use the following input data:

1. Total, net sales
2. Total, cost of goods sold
3. Divisional selling, administrative, research, engineering costs

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[1]"Corporate Accounting," Monsanto Company, 1970. (An unpublished report.)

4. Accounts receivable
5. Inventories
6. Gross property
7. Accumulated depreciation
8. Budgeted new construction.

From the input data the model generates output such as:

1. Income statement
2. Balance sheet
3. Cash flow statement
4. Other income/expense detail
5. Detailed expenses included in selling, administrative, research and engineering
6. Ratio analysis
7. Initial long-term debt
9. Borrowings and repayments detail.

The inputs can be used in the model as either a fixed amount, growth rate on the previous year, relationship to another variable, percentage of another factor or as a regression analysis. This provides flexibility in the model's use. The income statement is first generated from the input data. The functional relationships of the model used to generate the income statement are shown in Figure 2.

This portion of the Monsanto model displays the revenue/costs relationships under varying alternatives of employing the firm's resources. The output, income statement, from Figure 2, presents a six-year projection of these revenue/costs relationships.

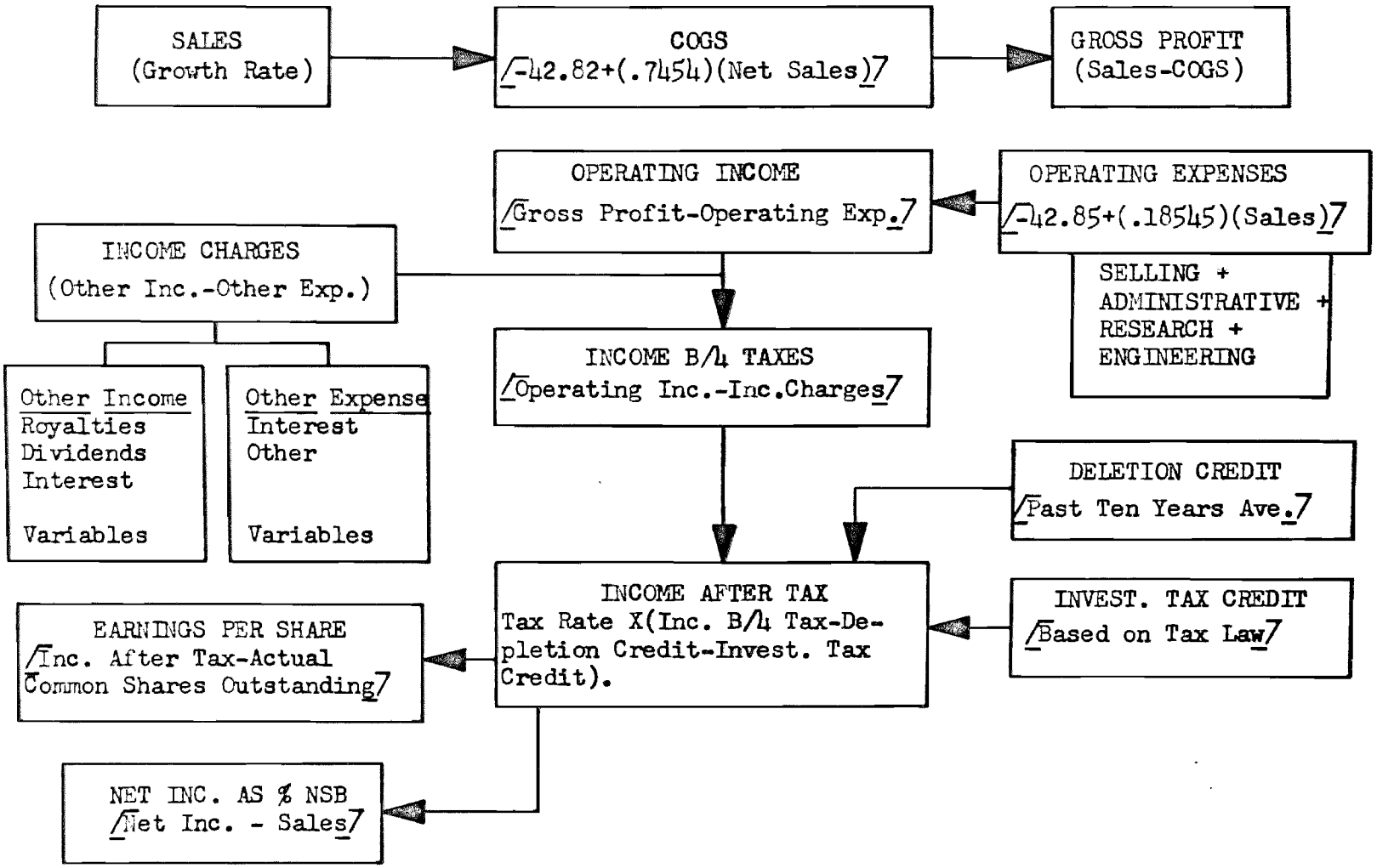


Figure 2. Functional relationships of income statement generated by the Monsanto Model.

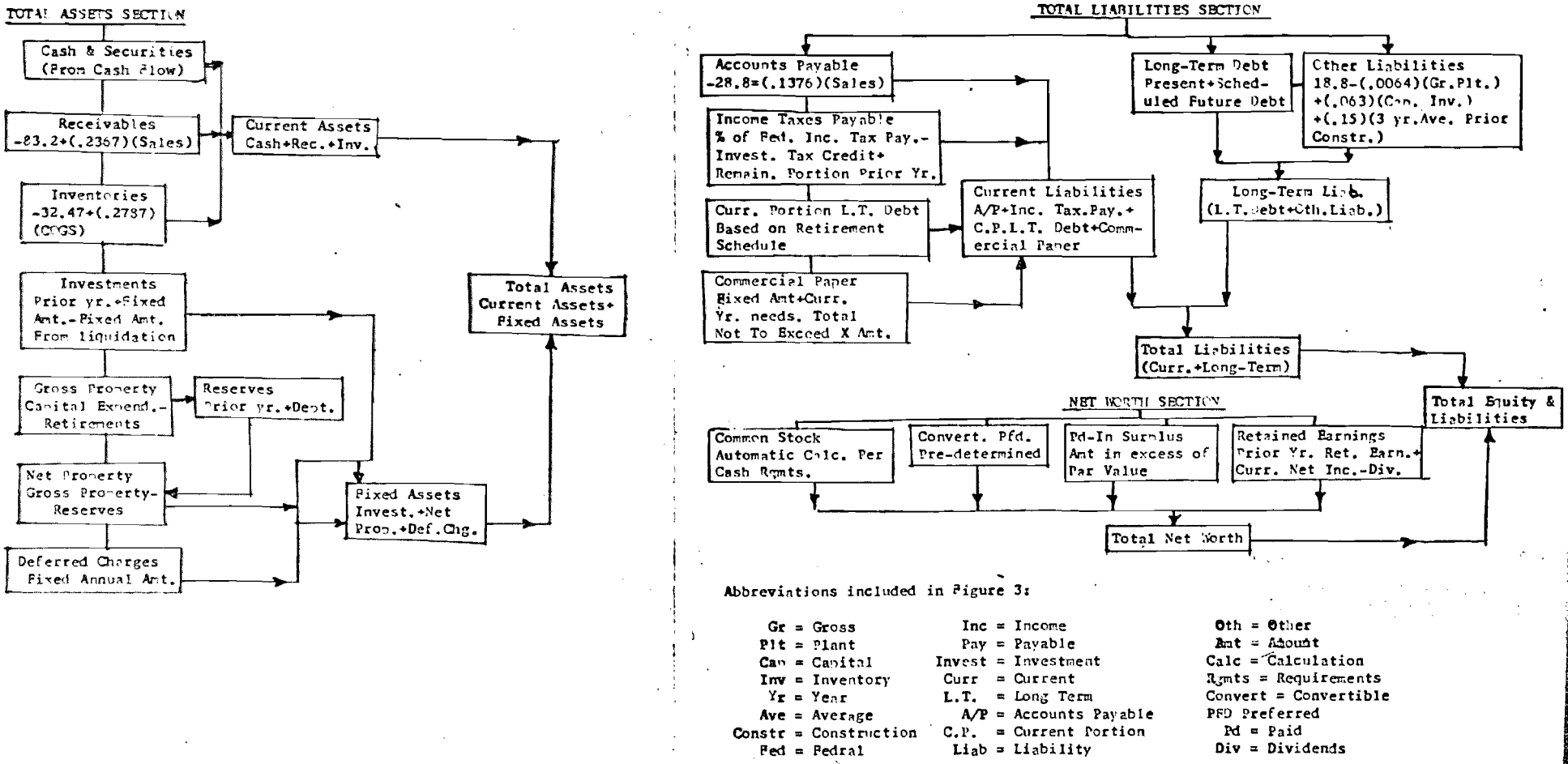
Another portion of the model is the balance sheet. The functional relationships of the variables and equations are included in Figure 3.

The output generated is in the form of the Balance Sheet as described in Figure 3. It provides the company with a financial and an economic status of the business under pre-determined conditions.

The data provided by Figures 2 and 3 represent the core of the model and the two key outputs. Additional information and analyses can be automatically provided from the income statement and balance sheet data. There are also other outputs including a cash flow statement and ratio analysis summary that provide a six-year forecast as do all the outputs.

Variables used in the model number fifty-five for the base year and 127 for forecasted years. The model also provides the capability of modifying any of these variables. By using sensitivity analysis, the effects of changes in a variable upon key indicators such as net income or return on investment can be evaluated. Another feature of The Monsanto Model enables the measurement of effects of changes in more than one variable at a time.

The advantages of The Monsanto Model include first, consistent logic from analysis to analysis which enables competent comparisons and evaluations. A second advantage relates to the system design that eliminates human calculation errors. The third advantage is the minimal cost per analysis that the model provides. The fourth and



Abbreviations included in Figure 3:

Gr = Gross	Inc = Income	Oth = Other
Plt = Plant	Pay = Payable	Amt = Amount
Cap = Capital	Invest = Investment	Calc = Calculation
Inv = Inventory	Curr = Current	Rqmts = Requirements
Yr = Year	L.T. = Long Term	Convert = Convertible
Ave = Average	A/P = Accounts Payable	PFD Preferred
Constr = Construction	C.P. = Current Portion	Pd = Paid
Fed = Federal	Liab = Liability	Div = Dividends

Figure 3. Functional relationships of balance sheet generated by the Monsanto Model.

fifth advantages could be combined and defined as fast response to questions through simplicity.

Monsanto has also established other, smaller computer models. They were designed for specific narrow applications such as depreciation schedules, various return on investment calculations and others.

SUN OIL COMPANY MODEL[1]

The Sun Oil Company's financial model is the only model that has been widely publicized by a company. Details relating to the development and application of the model have been published by the individual responsible for building it, George W. Gershefski.

The model was structured beginning in 1965 and required thirteen man-years to complete the first working version (mid-1966). An additional ten man-years was taken to familiarize management and incorporate improvements. In its finished form (mid-1967) it represented a tool for providing them with a fast, reliable method of projecting financial results based upon anticipated conditions. These financial results are in the form of net income, cash flow and balance sheet statements for both short-range and long-range projections. The projections are a result of simulating the operating procedures and accounting system through use of mathematical equations.

In the forecasting process Sun Oil Company uses the following inputs.

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[1]Gershefski, "The Development and Application of a Corporate Financial Model," op. cit.

1. Product prices and volumes
2. Raw material costs
3. General economic conditions
4. Investments
5. Subsidiary company incomes
6. Discretionary expense items.

Within these general groupings a total of 1,500 input items are involved in simulating one year. Of these items one-third are based on past averages or statistical relationships and the remaining two-thirds are developed by the operating departments. The large number of inputs was caused by Sun Oil Company's decision to treat items separately as inputs if a statistical relationship could not be found that would produce an accurate projection.

The output consists of the same basic reports described in the Monsanto model and will not be elaborated upon. However, there are sixty-one reports. Included are reports relating to the general or basic ones. In total 5,200 items of data are produced for each year by the model.

The model can be defined as a case study model. It is not an optimization model that screens a variety of alternatives to select the best one. It does not automatically consider variations in the forecasts submitted as inputs. The complexity of the model results from the nature of the company. Four different models are actually combined into one. These four models relate to production, transportation, manufacturing and marketing. Included also are thirty subsidiaries that supply input data for the model.

The case study model was selected because it was easier to develop than a linear programming type. Also, the results of the linear programming model are more difficult to interpret and the details causing the result are not defined. These difficulties in the linear programming model are a result of the number of inputs for each variable as contrasted to one input for each variable in the case study model.

Another characteristic of the model is that it is deterministic in nature. It forecasts results for only one given set of conditions as compared to the stochastic type that automatically projects the results for a wide range of future conditions.

The model was to be an information generator which begins with a limited number of inputs and generates new information. It was recognized that it would be more difficult to develop than an information compiler because the mathematical equations to be used must be developed and then tested for validity.

A further distinction is the broad-scope or general characteristic of the model. It was developed with the general operation of the company in mind considering only a few operational functions in detail. This approach was used so that more detailed studies of various segments of the business could be undertaken after the general model had been made operational.

A time period of one year was considered to be best in order to avoid seasonality problems associated with a monthly or quarterly approach. It was designed, also, to project forty years out, but five-year projections were considered the most useful.

Past historical data were tested to evaluate the model. The accuracy was calculated to be within 1 percent of the actual results.

To provide the Sun Oil Company management with the type of model described above Gershefski and his staff undertook a detailed analysis of the income statement. The resulting information became the framework for all subsequent steps in developing equations for the model. Results of this analysis were included in a large input-output diagram. These equations, translated into computer instructions, represent the main part of the model.

Multiple regression analysis was used by the Sun Oil Company to develop interrelationships. An example of one such relationship is depicted in Figure 4. As Figure 4 illustrates, multiple regression analysis was used to determine how costs were related to various levels of physical operations. Three hundred equations were considered with sixty of them used in the model. Most of the regression equations have a coefficient of determination in excess of 90 percent. Ten years of historical data were used to determine the regression coefficients.

The final documentation and organization of all the equations were grouped to form a series of blocks, or subroutines with each representing a specific aspect of the company's operations. The flow chart in Figure 5 illustrates the interrelationships of these blocks.

The results produced by the model are the income statement and those mentioned previously. All of the inputs and corresponding outputs are necessarily coordinated by use of a number of programs,

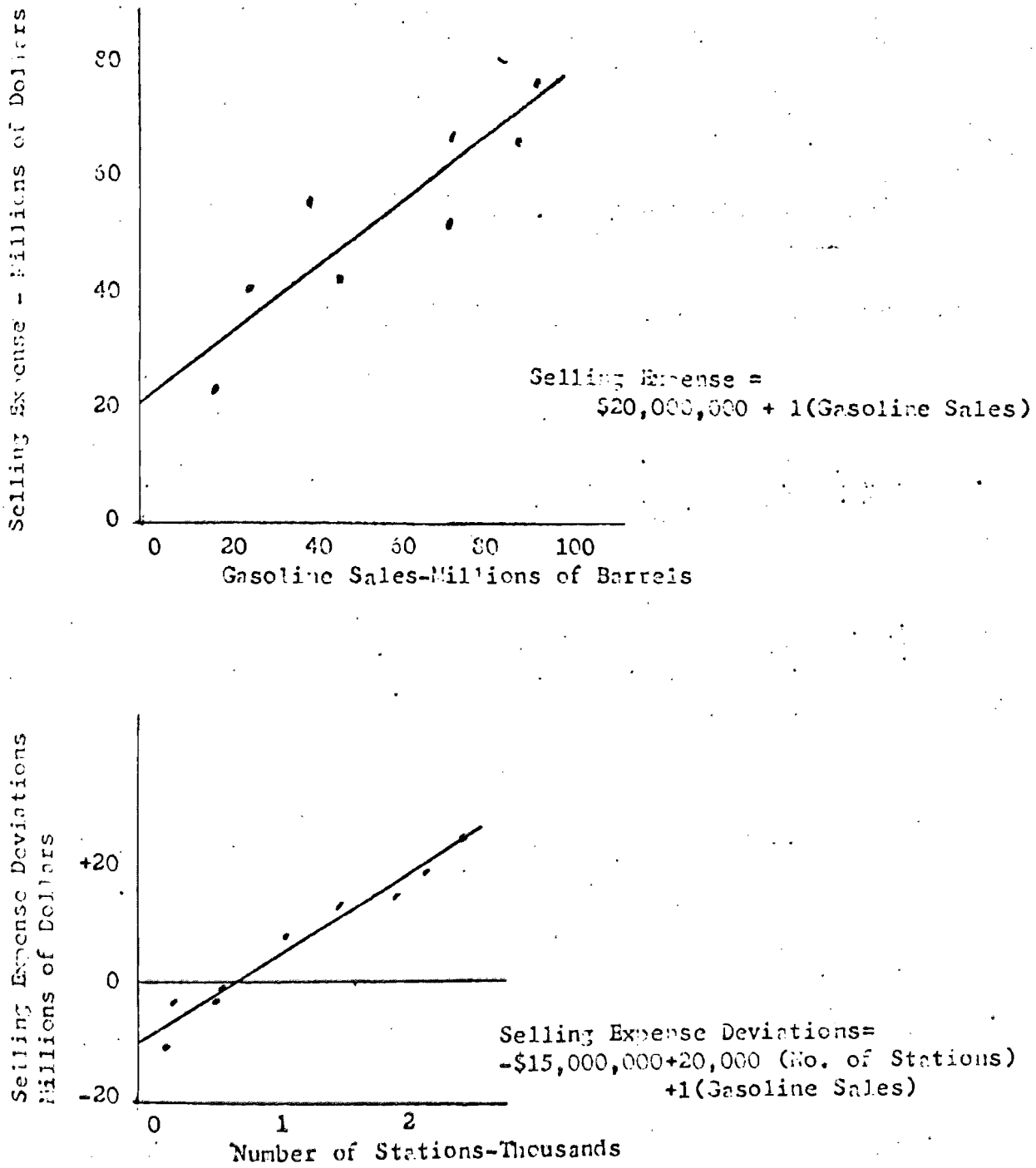

Figure 4. Example of multiple regression used by Sun Oil Company.

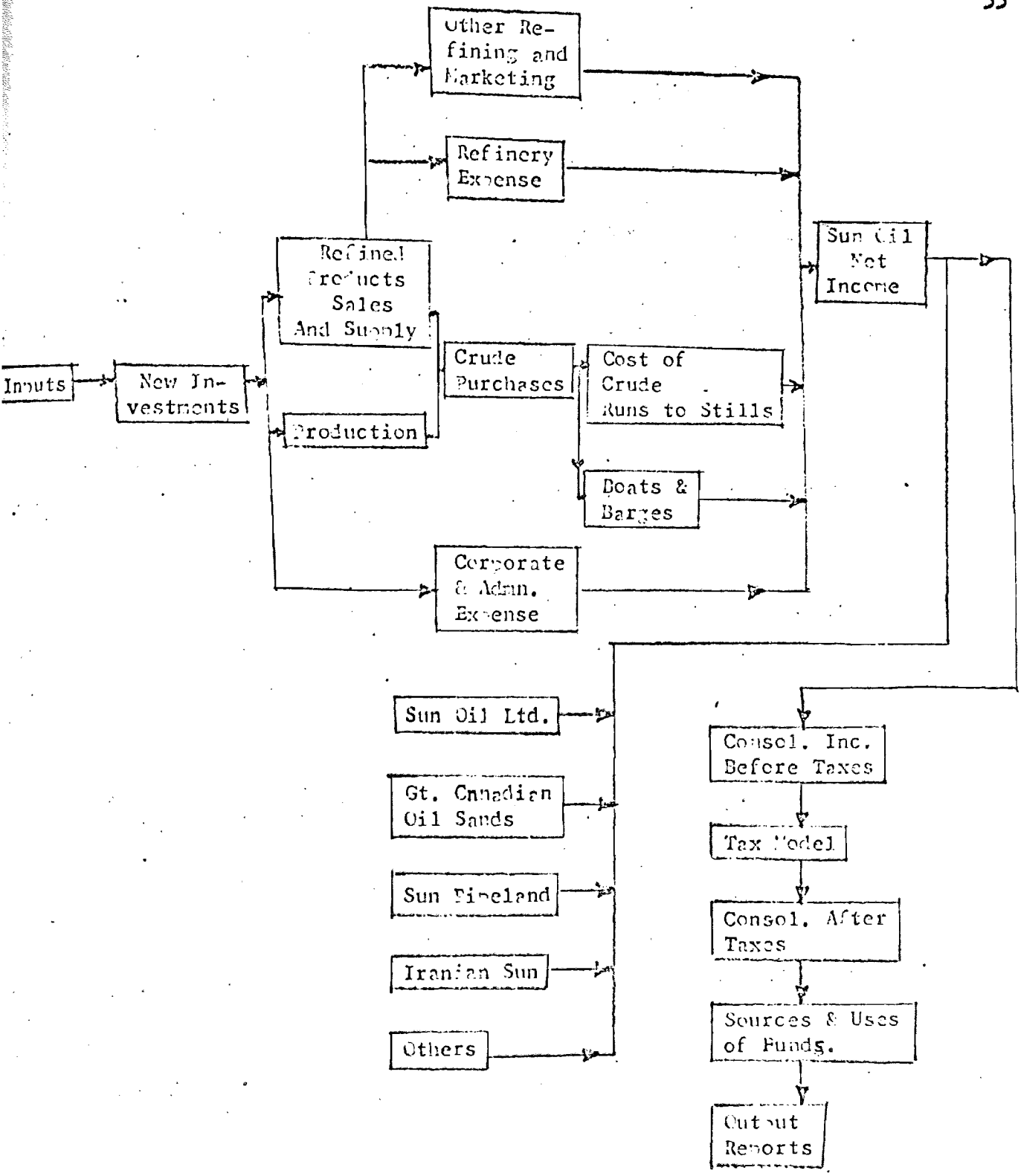

Figure 5. Example of flow chart used in the Sun Oil Company Model.

temporary storage facilities and information libraries. This network is the mechanism for the financial model's computer system.

From the general model established Sun Oil Company had planned to install budget assembly and analysis programs to eliminate much clerical effort relating to budgeting. This approach would generate directly the inputs required for the corporate model. The company also had intended to build models for various areas within the company for departmental decision making.

STANDARD OIL COMPANY'S MODEL[1]

The Standard Oil Company developed a deterministic simulation model for long range planning purposes. The model was based on the organization structure of Standard Oil which consisted of fifteen areas. Eight of the areas were geographic and the remaining seven areas were special, such as chemical.

The inputs to the model consisted of: (1) volumes, (2) prices, (3) costs, (4) capital coefficients, and (5) financial relationships. These inputs generate financial reports such as income statements, balance sheets and cash flow reports. Figure 6 outlines the general model.

The financing module analyzes financing policy for working capital, debt and other purposes. When a base case has been established for operating results, the module simulates various financial policies.

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[1]Albert N. Schrieber, Corporate Simulation Models (Seattle, Washington: University of Washington Printing Plant, 1970), pp. 71-91.

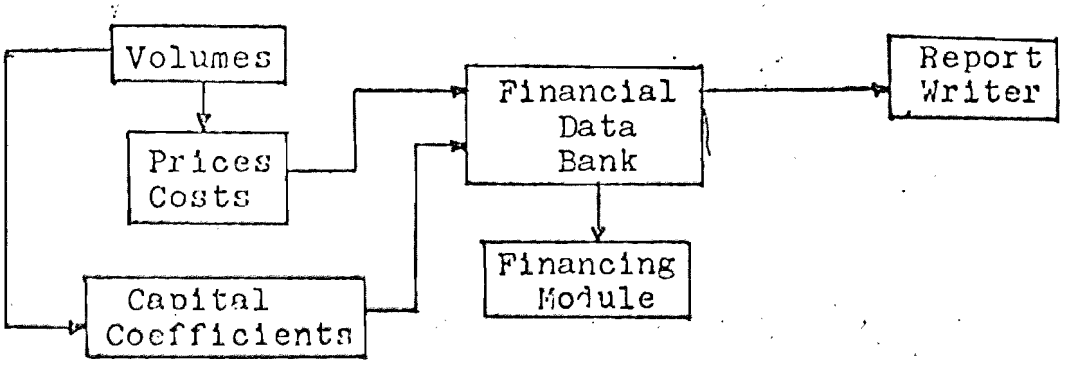

Figure 6. General Corporate Financial Model of Standard Oil Company.

A cascading system is used which allows considerable flexibility. Various detailed analyses or studies relating to product lines or other business factors can be fed into the model and used to generate financial output results.

Standard Oil Company has used the model for developing long-range plans, evaluating investment programs, and sensitivity analyses. It was also used for communication between the New York headquarters and field management.

DAYTON HUDSON CORPORATION'S MODEL[1]

The Dayton Hudson Corporation uses several different types of models. Two models were discussed by Anderson in his presentation to the American Statistical Association in Chicago in February, 1970.

One of the models was developed for use by Target, a low margin discount company. It was one of the first models developed by Dayton Hudson with the purpose of simulating the effect of strategic decisions on the operation of the firm. It was used to weigh the effects of various decisions on financial variables for up to ten years in the future.

In the development process the company wanted a generalized model providing an analysis of strategic alternatives, with a planning emphasis. The model was developed as a financial model to quantify relationships and analyze the resulting relationships. Its primary

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[1]John C. Anderson, "Planning Models at the Dayton Hudson Corporation," Presented to Midwest Convention of the American Statistical Association, Chicago, Illinois, February 19, 1970, pp. 1-22.

purpose was to relate decisions regarding expansion to the financial position of the firm.

The inputs consist of: (1) existing update, (2) assumptions, and (3) decisions. As defined by Anderson the existing update would be projections of present facilities' financial characteristics such as sales, expenses and capital expenditures. The company is described in its present condition.

The assumptions used correlate the financial variables to the decision. If a new store, there must be a relationship for sales, expenses and other financial factors. Regression analysis, or linear equations, are used to establish these relationships. All variable factors are defined and included in equations.

Decision inputs relate in this model to expansion of facilities. Acquisition of land is also included.

The basic financial reports that represent outputs of the model include:

1. Net income statement
2. Schedule of minimum rents
3. Schedule of capital expenditures
4. Mortgage principal and interest schedule
5. Depreciation schedules
6. Balance sheets
7. Sources and uses of funds.

There are three primary options available to management when using the model. These options are: (1) expansion or contraction

decisions involving where and how questions, (2) financial variables functions and effects pertaining to various cases, and (3) performance evaluation of the present operation enabling changes in current financial characteristics.

To make the model function according to the above description the user must describe relationships for income, sales and costs in both fixed and variable form to generate income statements. All elements must be quantified and included in equations to calculate each income statement item. The form most frequently used is that of simple linear equations. Included is the establishment of value of coefficients in the equations as well as the basic structure of a single equation to be used for all assumptions. The variables to be included must be defined. For example, inventories could be defined as a variable.

The user might state that inventories should be based upon prior year inventories, new store openings and inflation. Each of these factors must be interrelated to develop an accurate equation. Once the inventory changes with each new store and an inflation factor is established, the coefficients would be developed. By changing the coefficients and specific variables in the equation the user can change how the dependent variable is related to the independent variable.

Specific functional relationships and flow charts have not been made available by the company. Therefore, they could not be examined to obtain the type of information desired.

In contrast to the Target Model the Dayton Hudson Corporation also uses a "language approach" to model building. It represents a

generalized structure and contains no planning logic, but offers a simple procedure for developing the planning logic. They do not specify specific variables and the corresponding interrelationships. These are introduced by the individual using the model.

This type of model can be used in the planning function because of its flexibility. Management is able to use the model as a data base containing historical and current values for the financial variables.

The model consists of a defining mode, a building mode and a reporting mode. Access to any of the modes is obtained by using "action" codes during input. Each code specifies an operation to be performed by the model.

The defining mode is used to enter the definitions of the accounts and other data into the computer. Examples are the income statement accounts. Following this function, the building mode builds the contents and values of the accounts in the planning file. Quantitative values are assigned in this step. Finally, to design and generate the reports, or output, of the model the reporting mode is used.

OTHER MODELS

Other companies have developed models for various purposes and with varying degrees of success. These companies include such companies as Xerox, Weyerhaeuser, Corning Glass Works and Celanese Chemical.

These models were intended to serve management's need in such areas as reducing manual efforts and expediting preparation of financial data, forecasting product mix and corresponding cost

relationships, and enabling management to obtain a better fix on the operation of a given plant.

Problems incurred in the development and use of some of these models pertained to the failure to clearly establish the interrelationships of the input variables. Rapid growth rates also created problems since historical data became difficult to use. Other problems were inherent in models that were too specific or those that dealt with a narrow or one-time problem situation.

Generally, however, the models provided management with many advantages and information that might never have been available otherwise. Greater planning confidence was established in some cases and in all cases ease and speed of forecasting were definite advantages. In several cases second and third generation models were developed to include improvements and efficiencies discovered from the use of the prior model.

III. SUMMARY

From the review of the literature and information available on models developed and used by various companies there are several significant points that require summarizing. These points are reviewed in this section.

First, computer technology has provided the key impetus in financial model building and usage. Not only does the computer provide the speed and efficiency required, but it also enables a more comprehensive examination of the firm's resources as related to variables and

their interrelationships. Additionally, a variety of case situations and alternatives can be compared for management decision making and planning.

Second, it is important to avoid the pitfall that some companies encountered by attempting an overly complex model with too many departments involved. Often, the result of these problems was a scrapped model or one that required major modifications. In this light the more efficient models are more simplified and are of the simulation, case study type.

Third, the most important single use of the models is generally for forecasting and overall coordination of the resources. This represents the area that is of primary interest for development of the Fisher Controls Company Model.

Fourth, the primary documents projected by the model include, but are not limited to, a profit and loss statement, balance sheet, cash forecast and financial analysis statement. These outputs represent the results of the assumptions and variables built into the model by management and/or the forecaster and summarize the degree of efficiency made of the firm's resources.

CHAPTER III

FISHER CONTROLS COMPANY'S FINANCIAL FORECASTING MODEL

A formal profit planning system was introduced at Fisher Controls Company in 1962 and the system has been modified and added to since that time. Financial forecasting on a semi-monthly basis supplemented by special forecasting as required, has also been introduced in the last several years. With the present emphasis being placed on forecasting and the frequency of forecasts involved more accurate and expedient projections can be made available to management through the use of a computerized financial forecasting model.

This model has recently been designed and put into use for Fisher Controls Company. The design and characteristics of the model are presented in this chapter.

I. CHARACTERISTICS OF THE MODEL

The first phase in the design and development of the model was to define the type and the specific characteristics it should contain in the terms discussed in Chapter II. There are six such characteristics that should be defined.

First, it was determined that the model's purpose would be to provide financial forecasts in terms of profit and loss statements, cash forecasts, balance sheets and a financial analysis summary.

These forecasts would be provided on a given set of assumptions and inputs. As a result, the model design would then relate to the case-study type of model that generates financial statements.

Second, the model would be computerized in order to utilize the accuracy and speed provided by computer technology.

Third, due to the large number of fixed and variable factors required to generate the financial statements and the relationships that would have to be established between them, a mathematical model would be necessary.

Fourth, the model would be a "top-down" model that would utilize assumptions and inputs from the forecaster and/or top management rather than using inputs from all the lower levels of management up through top management.

Fifth, the objective would be to establish the formulae and output formats and write the computer programs. Should some adjustment be required in a formula, it could be changed as the test program proves it to be inaccurate. This prevents the "hang-ups" that other companies ran into that caused either delay in model development or frustrations that prevented the model from ever getting on-stream.

Sixth, to test the accuracy of the model and each formula actual data would be used for the three months of April, May and June of 1971. In this way problems could easily be identified and corrected. Also, the accuracy of the model results could be compared with the actual results for each of the three months.

With these model characteristics and the approach defined the design of the model was undertaken. The design was accomplished for each output separately. First, the profit and loss statement was designed; second, the cash forecast; third, the balance sheet; and lastly, the financial analysis summary. This sequence of the design is important in order to assure proper data flow.

II. DESIGN OF THE OVERALL MODEL

The design of the four major parts of the model is examined for each separately in the subsequent four sections. However, it is important that their relationship to the design of the overall model be understood.

The overall model requires generation of the profit and loss statement first. Some of the data from the profit and loss statement are used in the computation of the cash forecast, the balance sheet and the financial analysis summary. Also, the cash forecast provides most of the data required for the balance sheet. The financial analysis summary is completely dependent upon data from the profit and loss statement and balance sheet portions of the model. This specific design characteristic is shown in Figure 7.

Figure 7, besides indicating the sequence of preparing each major element, also depicts the items that flow from one major element to another. For example net income, once computed in the profit and loss statement, is also used in the balance sheet and the financial analysis summary.

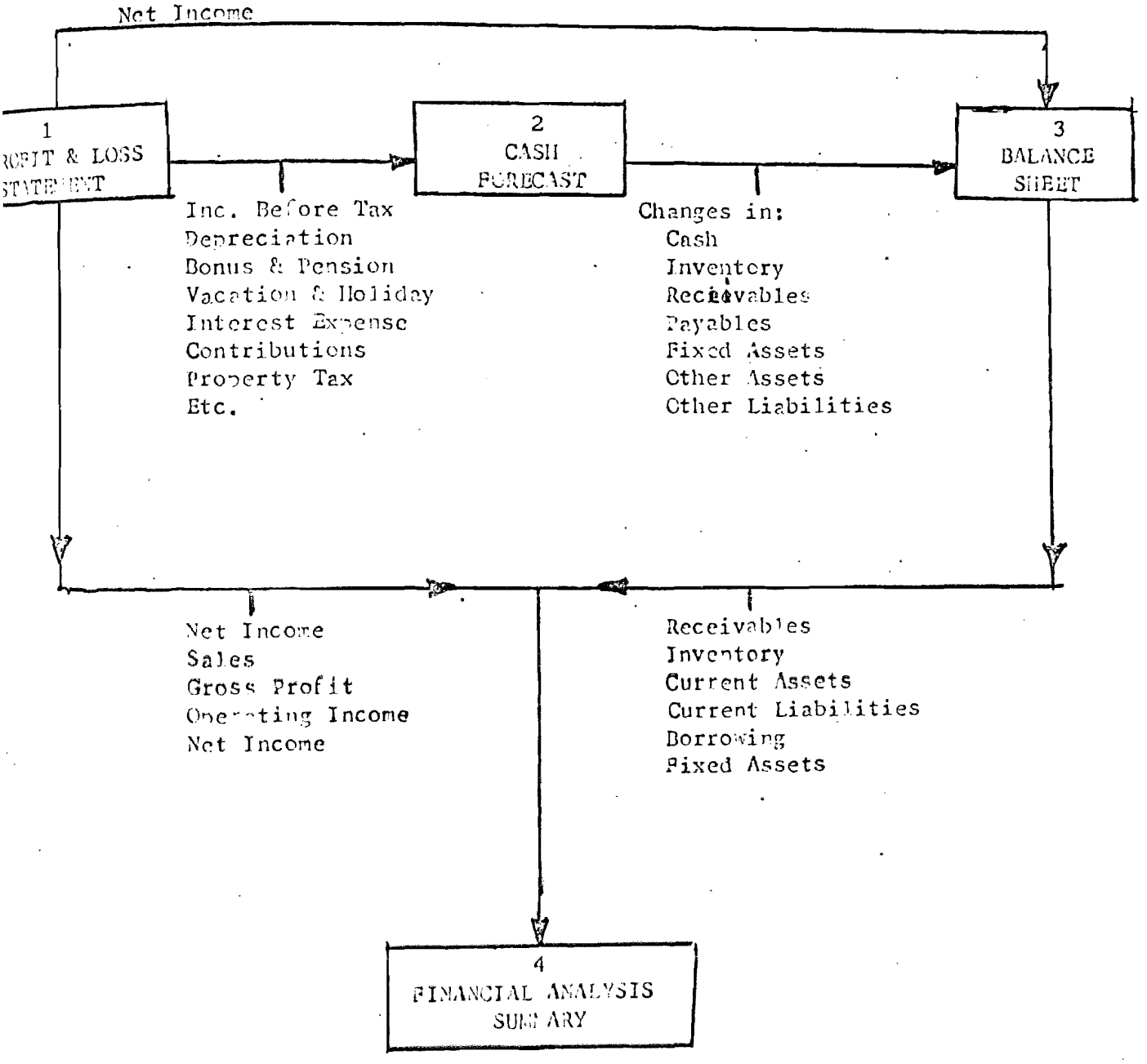


Figure 7. Sequential data flow design characteristic of the major elements of the financial model.

Another design consideration for all the major elements of the model relates to the number of time periods that could be displayed. It was decided that the model would use twelve time periods with the ability to consolidate all of the twelve or any number fewer than twelve. This provides the capability to forecast for a year by month or any portion of a year.

The time periods can also be defined as quarters, years or whatever time span is desired. Also, this approach provides for each time period to be used as an entirely different case-study. In this way alternative situations can be generated by the model for evaluation by management.

The other and more specific design functions relate to each of the major elements of the model. They are discussed in the balance of this chapter.

III. DESIGN AND OPERATION OF THE PROFIT AND LOSS STATEMENT MODEL

The first major part of the overall model relates to the profit and loss statement. As the title indicates, this part of the model provides the method of forecasting revenues, expenses and the resulting profit or loss.

In the computerized profit model that has been developed for Fisher Controls Company each profit and loss statement account is represented by a formula. These formulae were structured to calculate

dollar values for their respective accounts and are comprised of both fixed and variable factors.

Product line and format considerations. The first step necessary to the design and operation of the model was the determination of the number of product lines to be included in the model. Since the company has recently developed and marketed a new electronics product line, it was decided that there should be a separate projection for it. As a result, the model allows for a separate forecast for the valves, regulators and controllers (VRC) product line; a second one for the analog control electronics (ac^2) product line; a third one for the digital control (dc^2) product line; and a fourth one for the consolidation of the other three. These profit and loss statements were designed to consolidate in the form shown in Table III.

Formulae development and their function in calculating the profit and loss statement accounts. The second step in the profit model design and operations involved the important task of examining the profit and loss statement accounts and establishing formulae for them.

The purpose of the examination was to determine how the dollar values could be established for each account. It was found that some of the accounts' amounts were fixed; some were variable and still others were comprised of both fixed and variable factors. All of these profit and loss statement accounts are summarized in Appendix B. There

TABLE III

CONSOLIDATION DESIGN FOR THE PRODUCT LINES
USED IN THE PROFIT MODEL

	VRC		ac^2		dc^2		Total	
	$ Amount	% of Sales	$ Amount	% of Sales	$ Amount	% of Sales	$ Amount	% of Sales
Sales	--	--	--	--	--	--	--	--
Cost of Goods Sold:								
Material	--	--	--	--	--	--	--	--
Labor	--	--	--	--	--	--	--	--
Burden	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--
Gross Profit	--	--	--	--	--	--	--	--
Selling, Administrative, Research, and Engineering	--	--	--	--	--	--	--	--
Operating Income	--	--	--	--	--	--	--	--
Other Income (Expense)	--	--	--	--	--	--	--	--
Income before Tax	--	--	--	--	--	--	--	--
Taxes	--	--	--	--	--	--	--	--
Net Income	--	--	--	--	--	--	--	--

are 224 separate accounts used in the calculation of the VRC profit forecast and eighty-two accounts each for the ac^2 and dc^2 profit forecasts.

Once the accounts in Appendix B had been examined and the variable and fixed factors identified, the formula for each was established. The formulae vary in complexity from a dollar amount input to a nineteen step mathematical computation. These formulae are all included with the accounts they are used to calculate in Appendix B. As indicated in that appendix, some of the formulae and some portions of others are dependent upon the dollar values of the other accounts. Where this is not the case an "S" prefix is used to indicate that a fixed or variable number must be put into the model by use of an input table. A list of these input items is included in Appendix A.

The above process and the type of items being projected by the model are represented in Table IV.

As Table IV indicates, the accounts being projected obtain their dollar values from the formulae. It should also be emphasized that the formulae must have the fixed and variable input data before they can generate the dollar values for the accounts.

The source of the input data and the assumptions used are critical to the accuracy and purpose of the forecast. Since the model is of a case study, simulation type, it can be used for purposes ranging from evaluating the impact of labor contract changes to forecasting the next month's profit.

Generally, the model has the most use in providing monthly forecasts. The source of the input data for this purpose is supplied by top management. The vice-president of manufacturing provides:

TABLE IV

FIXED AND VARIABLE INPUT DATA USED BY THE FORMULAE IN THE COMPUTATION OF DOLLAR VALUES FOR THE ACCOUNTS

ACCOUNT TITLES	ACCOUNT FORMULAE AND DESCRIPTIONS		INPUT DATA Fixed Portion	INPUT DATA Variable Portion
001 Specialty Sales-Without Price	S001	Dollar Value for Specialty Sales		S001
002 Parts Sales-Without Price	S002	Dollar Value for Parts Sales		S002
005 Price Increase-Specialty	001xS005xS006	Specialty Sales x % price increase x % of price increase effective		001 S005 S006
006 Price Increase-Specialty	002xS007	Parts Sales x % price increase		002 S007
009 Excess Credit	S015xS012	Dollar Daily Average x Number of Days		S015 S012
010 Standard Material COGS-Specialties	001xS016	Specialty Sales x %	S016	001
011 Standard Material COGS-Parts	002xS017	Parts Sales x %	S017	002
014 Standard Labor COGS-Specialty Machine Shop	001xS020	Specialty Sales x %	S020	001
015 Standard Labor COGS-Specialty Assembly	001xS021	Specialty Sales x %	S021	001

TABLE IV (continued)

ACCOUNT TITLES	ACCOUNT FORMULAE AND DESCRIPTIONS		INPUT DATA Fixed Portion	INPUT DATA Variable Portion
016 Standard Labor COGS-Parts-Machine Shop	002xS022	Parts Sales x %	S022	002
019 Standard Burden COGS-Specialty Machine Shop	001xS025	Specialty Sales x %	S025	001
027 Provision for Obsolete Inventory	(010+011)S033	(Standard Material COGS-Specialty+ Standard Material COGS-Parts) %	S033	010 011
034 Direct Labor Employment Levels	S041	Employment Level-Gov. Rd. Plant		S041
035 Standard Labor Output-Machine Shop	034xS012xS043x S044xS045xS056x S046	Direct Labor Employment Level x Number Days in Month x Number of Hours in Day x Vacation Factor x Absenteeism Factor x Wage Rate x Output per Hour.	S043	034 S021 S044 S045 S056 S046
065 Depreciation and Amortization Expense-Manufacturing	S074xS014	Weekly Dollar Amount of Depreciation x Number of Weeks	S074	S014
073 Holiday Expense-Manufacturing	$(046+047+053+055+058)\frac{S013}{S012+S013}$	$\frac{\text{(Direct Labor Payroll+Non-exempt Payroll) Number of Holidays}}{\text{Number of Working Days + Number of Holidays}}$		046 047 053 055 058 S013 S012

TABLE IV (continued)

ACCOUNT TITLES	ACCOUNT FORMULAE	AND DESCRIPTIONS	INPUT DATA Fixed Portion	INPUT DATA Variable Portion
139 Non-exempt Employment Level-Research	S147	Non-exempt Employment Level		S147
140 Non-exempt Spending-Research	139x(S012+S013)S148	Employment Level x (Number of Working Days+Number of Holidays)xDaily Wage		139 S012 S013 S148
151 Accounts Payable-Research	S159xS012	Daily Dollar Amount of Accounts Payable x Number of Days		S159 S012
191 Commissions on Specialty Sales	S199(001+005)	Commission % Rate Specialty Sales without Price + Price Increase	S199	001 005
442 Federal Tax Rate	S397	Tax Rate %	S397	

(1) sales dollar amounts, (2) employment levels for manufacturing, (3) direct material purchases data, and (4) other pertinent or unusual data for the time period in question. The officers of the other areas would usually supply employment level and other significant items that might change. All of the remaining input data, wage rates, fixed costs, employee benefits and accounts payable information is supplied by the forecaster by using historical data and modifying it where appropriate.

Assumptions must be made by the officers of the company, as well as by the forecaster, in supplying the input data. Generally, the sales levels are based upon forecasts that are made by the market planning group. The sales assumption becomes the key item since manufacturing employment levels, all items using percentage of sales relationships such as standard costs of goods sold, and commissions are dependent upon it. Other assumptions must be made regarding such items as wage rates and accounts payable amounts. These assumptions are based upon known and unknown factors. For example a known factor would be wage changes that are specified in an existing labor contract. An unknown factor would be wage changes that will result from a labor contract not yet settled. The time period being projected also has a bearing on the accuracy. A projection for a five-year period normally creates the need to adjust even the fixed inputs for the years following year one since in the long run all costs are variable.

Generation of the profit and loss statement forecast. The discussion of the model to this point has examined the accounts being projected, how the formulae are used to compute the dollar values for the

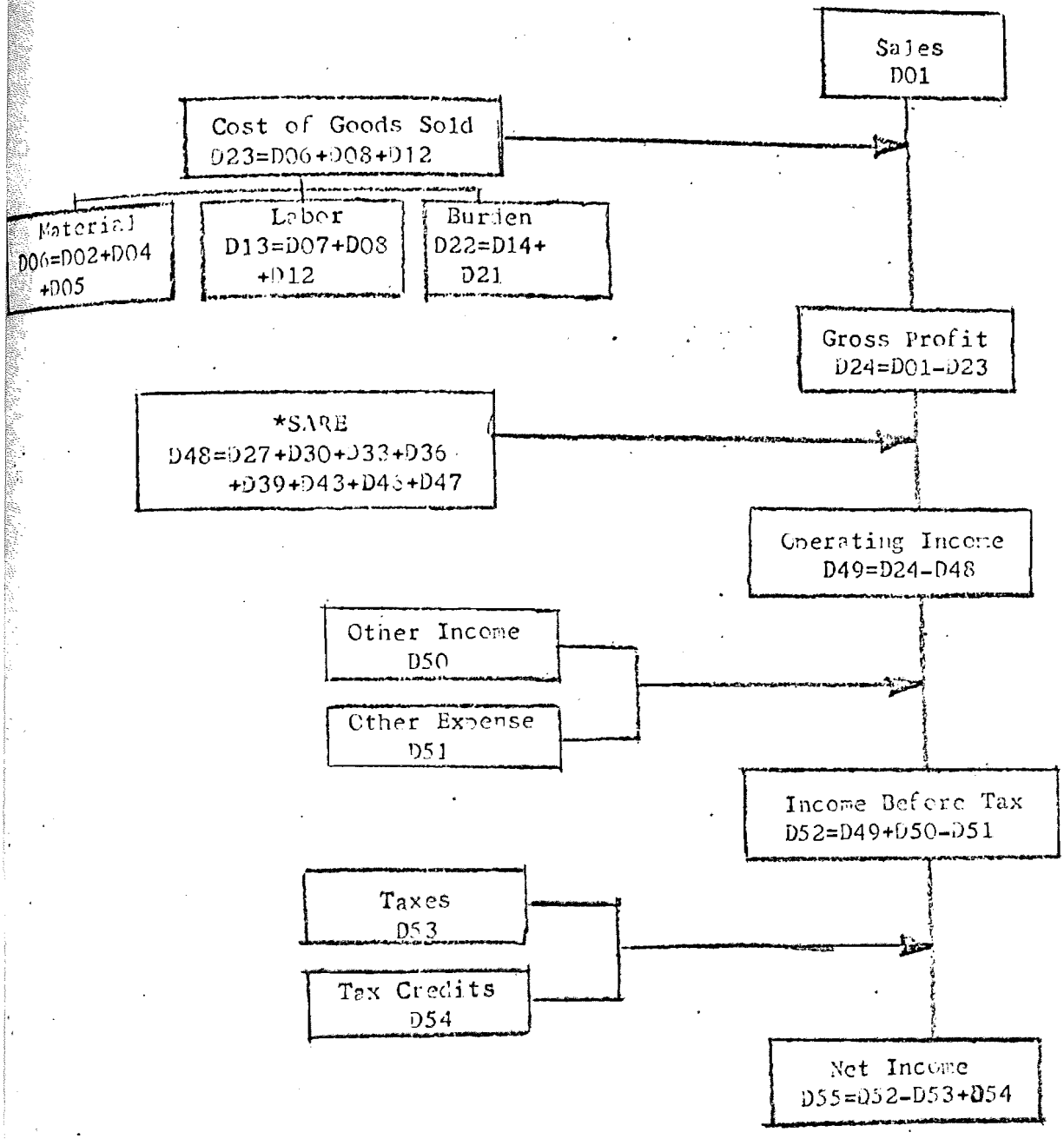
accounts and the fixed and variable input portions of the formulae. The source and assumptions for the input data was also reviewed.

The remaining design and operation characteristic of the model is the use of the inputs and account values to generate the profit and loss statement forecast. Once the values have been calculated for the accounts as demonstrated in Table IV, the computer arranges them in summary form for each of the three product lines as shown in Appendix C. This process is merely the addition and subtraction of the accounts in a standard profit and loss statement sequence. This process is displayed in Figure 8 for the VRC product line.

The computer, having calculated the profit forecast for each of the three product lines according to the method shown in Figure 8, then consolidates the three product line forecasts. The consolidated forecast is included as Appendix D.

The final step in the model process is the Computer print-out in the form described previously in Table III. This provides the profit results from the model.

In summation the profit forecast involves the input of fixed and variable factors by top management and the forecaster by using a set of assumptions. The input is then used in formulae to calculate dollar values for the profit and loss statement accounts for each of the three product lines. The dollar values are then used to generate the individual profit and loss statements for each product line, which are then consolidated. The final step is the computer printout displaying all four product lines. A graphical display of this entire process is included in Figure 9.



*SARE:
Selling, Administrative, Research and Engineering Expenses. These expenses include:
1. Wages and salaries
2. Commissions
3. Other

Figure 8. Computation process of the VRC profit and loss statement using codes shown in Appendix C.

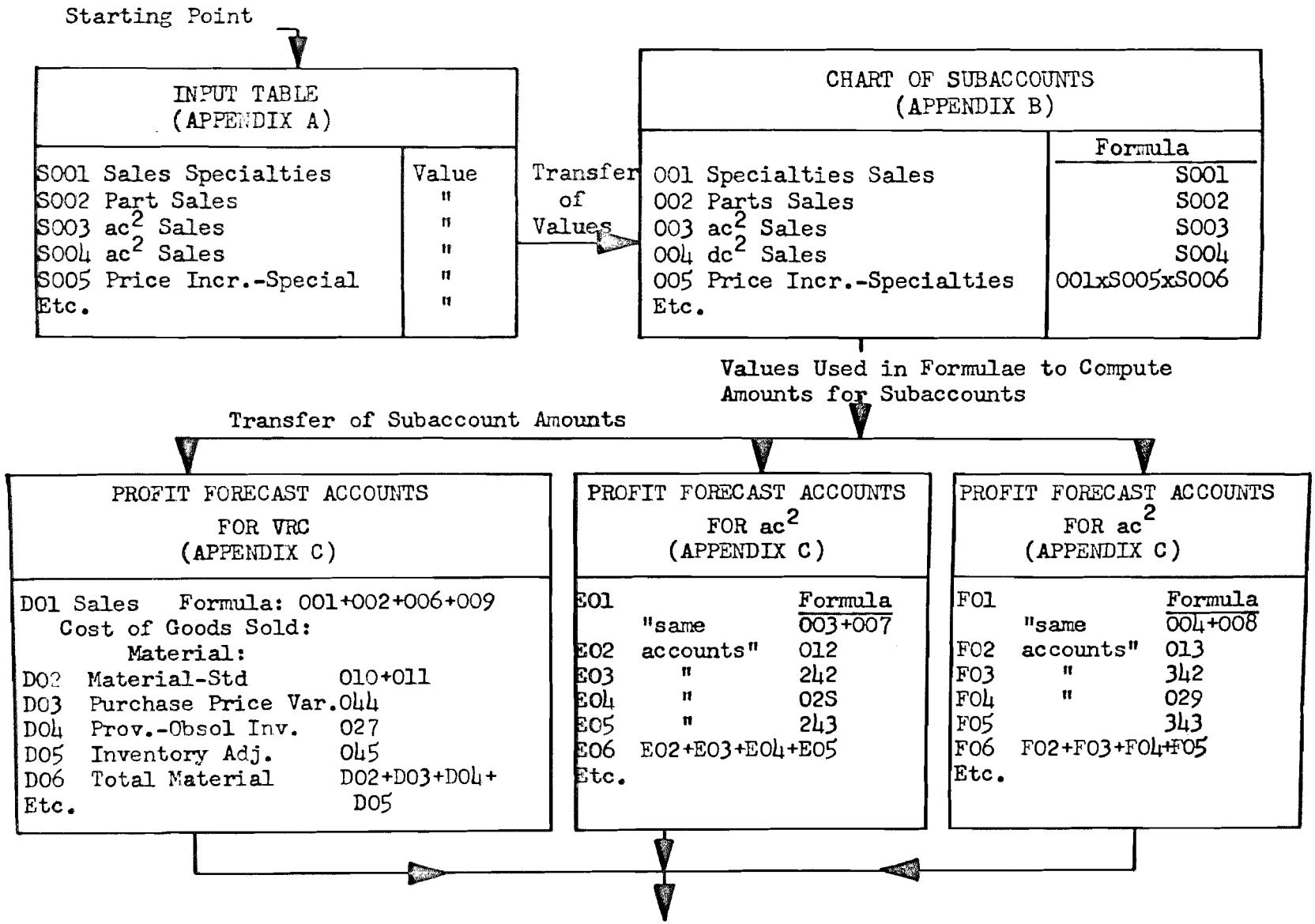


Figure 9. Diagram of the profit and loss statement model design and computational process for a single period.

1) Subaccounts Used to Compute Dollar Amounts for Profit and Loss Statement Accounts
2) Computer Codes "D," "E," "F" Used to Calculate Profit and Loss Statements

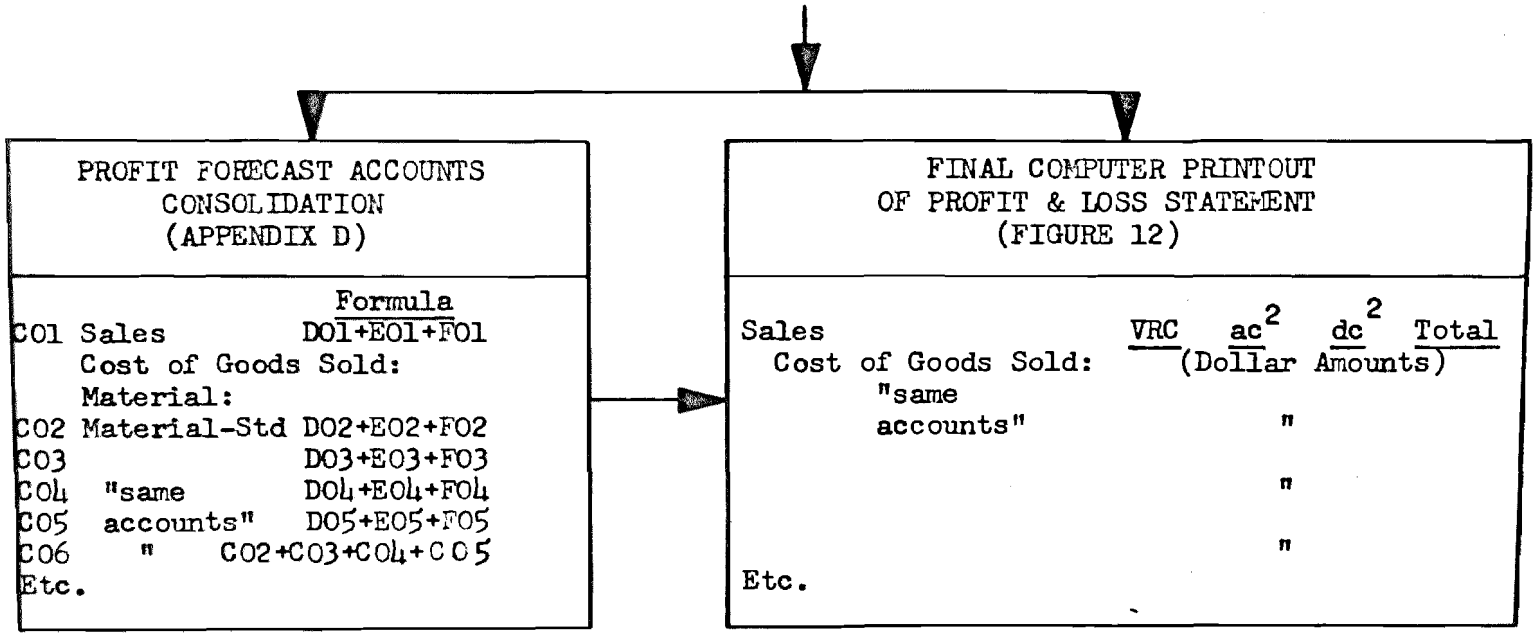


Figure 9 - (continued)

The model will compute the results for twelve time periods. However, each time period must be separately calculated by the process shown in Figure 9.

The design of the profit and loss statement model required very few modifications from its initial form. Several formulae were changed and a few minor computer program changes were made after the first test run. The model was tested three times before it was finalized due to dollar amounts in some of the accounts varying more than was acceptable. As was stated earlier, the test data were for April, May and June of 1971 in order that the profit and loss statements could be compared with actual results. After all adjustments, the model tested at a 95%+ accuracy level. Examination of the model outputs indicated that the accuracy level would have been higher had the input data been refined further by correcting rounding problems.

IV. DESIGN OF THE CASH FORECAST MODEL

The second major part of the model development involved the cash forecast. Its function was defined as being twofold. First, it would be used to evaluate the need for cash borrowing or the amount of excess cash available in each case study. Second, the cash forecast would be the method of obtaining changes in the balance sheet accounts and therefore, the design of the model required the ability to transfer the amounts in the cash forecast accounts to the balance sheet as indicated previously in Figure 7.

With these requirements defined the second consideration was the design of the output format. It was decided that the cash forecast

would only be required for the total business rather than requiring a separate forecast for VRC, ac^2, dc^2 and the total.

The third step in the design of the model was the examination of each of the accounts included in the cash forecast, as included in Appendix F, to determine how the dollar amounts would be computed for each. This review established that a majority of the values would be obtained from the previously calculated profit and loss statement. Those values not obtained from the previously calculated profit and loss statement were separately identified and assigned a "T" prefix. The table of these items with their descriptions is included in Appendix E. There are eighty-six of these items that must be put into the model by use of an input table. Unlike the profit model, these inputs are determined primarily from historical or known values. Exceptions are items such as sale and purchases of fixed assets that must be estimated by the forecaster.

The fourth step required development of the formulae for each of the accounts. The sixty-three formulae that were developed are included beside the accounts they are used to compute in Appendix F.

Appendix F then uses the formulae to obtain dollar values for each account and in turn generate the cash forecast. The cash change amount, which is the goal of the model, is generated from the formulae in the sources and uses accounts as shown in Figure 10.

Like the profit model, April, May and June of 1971 were used as test periods. Here, the accuracy of the model tested less than that of

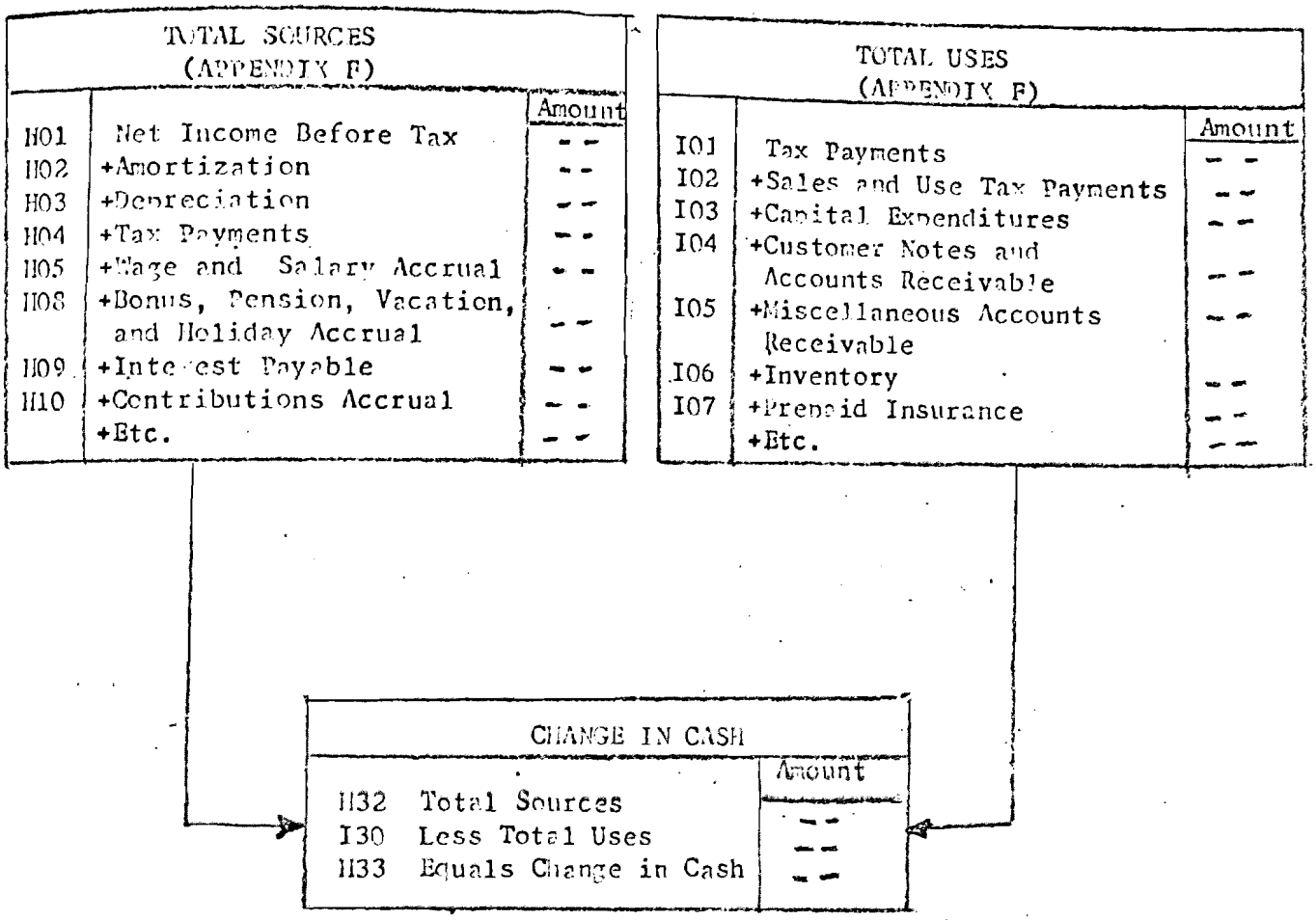


Figure 10. Computation of the change in cash from the accounts in the sources and the uses sections of the cash forecast model.

the profit model. This was to be expected since cash forecasting is dependent upon far more variables. The accuracy was in the 90 percent range for the three-month period.

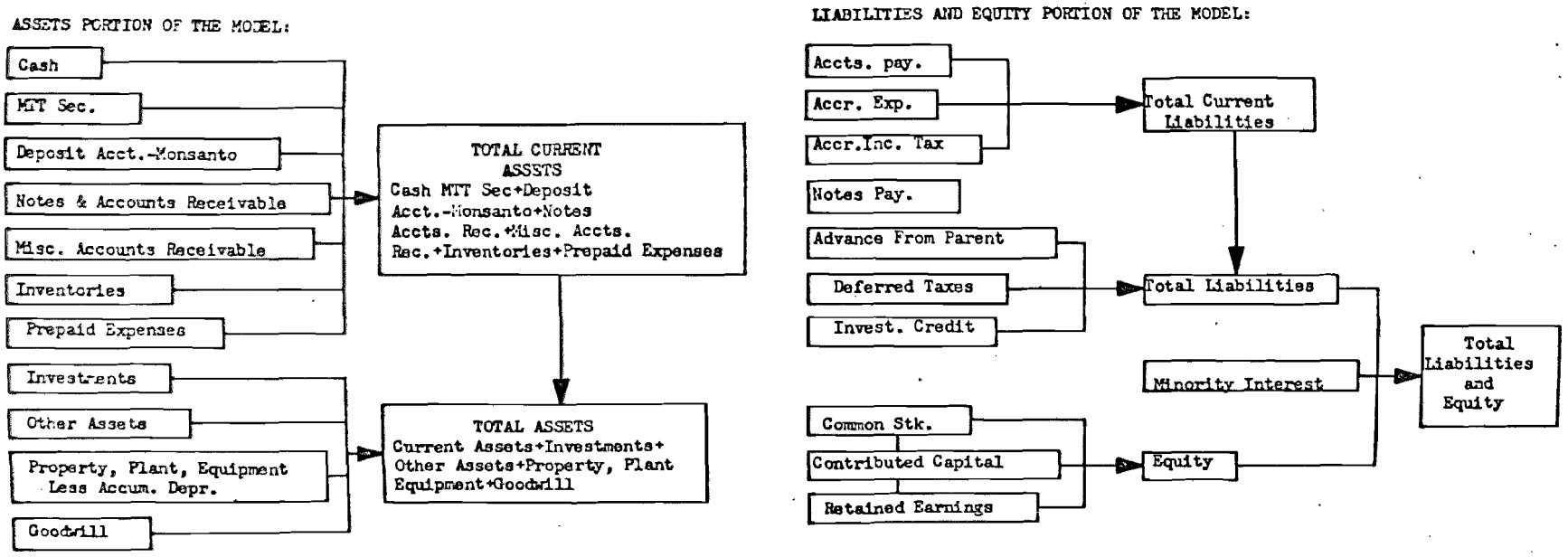
V. DESIGN OF THE BALANCE SHEET MODEL

The third major part of the financial forecasting model is concerned with the balance sheet. Several different design techniques were required in the balance sheet model than were required for the profit and cash models.

The first difference related to the format design. Since the majority of the accounts are dependent upon the values generated by the cash forecast, it was necessary to structure the balance sheet format consistent with that of the cash forecast format. In this way the accounts are the same for each and the values are easily transferred to the balance sheet.

The balance sheet structure is provided in Figure 11. This figure also represents the method used to generate the dollar values and balance sheet statement. Like the profit results, this is for one time period.

Those values that are not obtained from the cash forecast were separately identified and coded with a "U" prefix. These items were included in a separate table and that table is included in this paper as Appendix G. The model design requires that a beginning balance be supplied for each balance sheet account for the period being forecasted. To this beginning balance the change in the account during the time



Abbreviations Included in Figure 11.

MTT = Marketable
Sec. = Securities
Acct. = Account
Misc.= Miscellaneous
Accum. = Accumulated
Depr. = Depreciation
Rec. = Receivable

Figure 11. Design of the account structure for the Balance Sheet model.

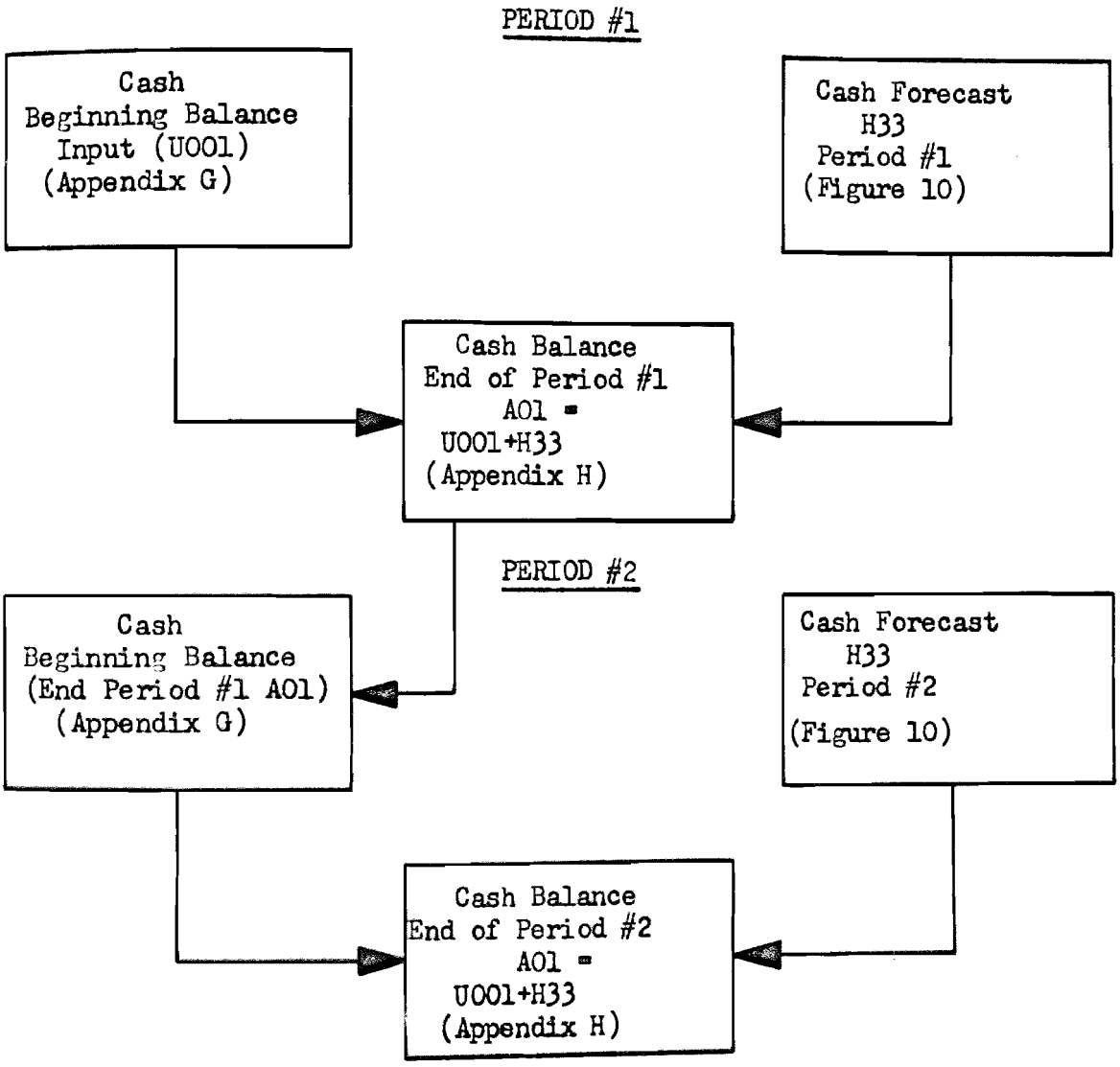


Figure 12. Computation of account values for the balance sheet model.

period is added or deducted. This change in the account is provided by the cash forecast model. The design characteristic is explained by using the cash account for Period #1 as an example in Figure 12.

Figure 12 also shows another key design characteristic of the balance sheet model. Once the model has calculated the values for Period #1, those values are used as the beginning balances in the calculation of Period #2 amounts.

Appendix H represents the formulae for all of the seventy-three accounts in the balance sheet model. It is apparent that the accuracy of the balance sheet forecast is completely dependent upon the accuracy of the cash forecast. The program testing results for April, May and June of 1971 were identical to those of the cash forecast.

IV. DESIGN OF THE FINANCIAL ANALYSIS SUMMARY

The last major part of the model is the financial analysis summary. This part has been designed to provide an analytical review of the profit and balance sheet forecast results.

Formulae were constructed that would represent the commonly used indices for financial statement examination. These formulae are based upon the values provided from the profit and balance sheet models as Figure 7 indicated. There are, however, three values that must be put into the computer directly. These values and the formulae used to compute the indices are included in Figure 13.

ACCOUNT	DESCRIPTION	*FORMULAE AND DESCRIPTION
J01	Customer Receivable Period:	$\frac{A05 \times 90}{C01_{T-1}+C01_{T-2}+C02_{T-3}} = \frac{\text{Accounts Receivable} \times 90}{\text{Last 3 Months Sales}}$
	Inventory:	
J02	Turnover Rate:	$\frac{(V002+C23)XV003}{\frac{V001+U015+A17}{2}} = \frac{\text{Annualized Cost of Sales}}{\text{Average Inventory}}$
J03	Days Supply:	$\frac{J02}{360} = \frac{\text{Turnover Rate}}{360}$
J04	Net Working Capital	A21 - B27 = Current Assets - Current Liabilities
J05	Current Ratio	$\frac{A21}{B27} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$
J06	Total Borrowings	B28 + B29 = Notes Payable + Borrowings
	Gross Investment:	
J07	Property	A31
J08	Working Capital	J04
J09	Total	J07 + J08
J10	Return on Investment	$\frac{C55}{\frac{S014}{J09}} \times 52 = \frac{\text{Annualized Net Income}}{\text{Gross Investment}}$
J11	Turnover	$\frac{C01}{J09} = \frac{\text{Sales}}{\text{Gross Investment}}$
J12	Gross Profit % of Sales	$\frac{C23}{C01}\ \frac{D23}{D01}\ \frac{E23}{E01}\ \frac{F23}{F01}$
J13	Operating Income % of Sales	$\frac{C48}{C01}\ \frac{D48}{D01}\ \frac{E48}{E01}\ \frac{F48}{F01}$
J14	Net Income % of Sales	$\frac{C55}{C01}\ \frac{D55}{D01}\ \frac{E55}{E01}\ \frac{F55}{F01}$

Figure 13. Computational process of the indices for the financial analysis summary.

*The data used in the formulae are identified in Appendices D and H.

V001 = Beginning of Year Inventory
V002 = Cumulative Cost of Goods Sold Prior to Forecast Period
V003 = Annualization Factor

VII. SUMMARY

The financial forecasting model was designed in four major parts: (1) profit model, (2) cash model, (3) balance sheet model, and (4) the financial analysis summary. The model requires this sequence in its computation process.

These major parts were designed to provide speed and accuracy in forecasting the effect of applying the company's resources under a given set of assumptions for a specific time period. Twelve time period forecasts can be made at the same time by inserting a different set of values for the formulae.

The forecasts are generated from the assumptions and assigned values prescribed by top management and/or the forecaster. These forecasts could be generated for a variety of reasons since the model is of a case study, simulation type. The basic use, however, relates to monthly profit forecasting.

CHAPTER IV

PROBLEM, PROCEDURE, RESULTS AND CONCLUSIONS

I. PROBLEM

The rapidly changing economic conditions and increasingly competitive business environment have created the need for more effective and timely planning and decision making on the part of management. The decisions made by management involve the employment of the firms' resources and are important to the future success of business.

New techniques have been and are continuing to be developed to meet this need. One of the most recent management tools that has been developed is the financial forecasting model. This type of model uses computer techniques for speed and accuracy.

To assist Fisher Controls Company in its objective of maintaining an efficient profit planning system it is necessary to evaluate new methods for possible use. A computerized financial forecasting model was considered such an item and was to be evaluated, and if practical, designed and implemented for use in the company's profit planning system.

II. PROCEDURE

The study involved the review of the literature that was available on computerized financial models. The literature related to both

theoretical and practical applications. The practical applications were written by individuals who had been involved in development of models for their companies. This type of information revealed design characteristics and problems encountered by the companies. These items were documented in order to avoid those problems and to select the design characteristics best suited for Fisher Controls Company.

In addition to researching literature available on model building personal interviews were conducted with individuals who had experience in model design and use. These interviews included meetings, telephone conversations and written correspondence. Included were professors, consultants and businessmen who had worked with models.

After examination of a number of models that had been developed and used by other companies, it was necessary to define the type and characteristics of the model that would be the most beneficial to Fisher Controls Company. This required that the use of the model be defined first. Once the use, forecasting on a case study basis, had been established, the relevant findings from reviewing the literature and from personal interviews were incorporated into the model's design.

Since the model was to be used to project the profit and loss statement, cash forecast, balance sheet and provide a financial analysis summary, it was important that the account structure of these statements be studied. Formulae for projecting the accounts were then established from the account structure review.

The model was constructed from the formulae by first designing the profit and loss statement portion. The profit model design also

provided for the results to be used in the computation of the cash forecast which was the second part of the model. Sequentially, results from the cash forecast then became the basis for the balance sheet forecast. The financial highlights of the profit and balance sheet models were included in the fourth part of the model, the financial analysis summary.

Once the model had been designed, the computer programs were written and tested for accuracy. To provide test data and capability to measure the model's accuracy the months of April, May and June of 1971 were used.

III. RESULTS

From the procedure reviewed in the previous section a computerized financial forecasting model was designed and implemented for Fisher Controls Company. The first use of the model was to verify that the formulae were correct and that the model would provide accurate data. This required that the financial statements generated from a test run be compared against past actual financial statements. The months of April, May and June of 1971 were used for the test run. After the third test run and adjustments to the formulae, the model tested at a 95 percent accuracy level for the profit and loss statement and a 90 percent accuracy level for the cash forecast and balance sheet. Higher accuracy levels could have been established had the input numbers not been rounded. However, it was decided that the formulae were correct and that the model functioned properly since the

output results from the model measured very close to the actual reported results for the three months tested. As the model is used for forecasting, the reliability of the output results can be measured with current financial results to assure the proper functioning of the model and accuracy of the input data.

TABLE V

USES MADE OF THE FINANCIAL FORECASTING MODEL

DESCRIPTION OF USES	FREQUENCY
1. Current Month Profit Forecasts	At Least Once Each Month
2. Balance of the Year Profit Forecasts (By Month for Next Quarter and by Quarter for Other Quarters)	At Least Once Each Quarter
3. Annual Budget Preparation	Number Varies from Two to Six per Year
4. Long Range Plan Preparation	Once a Year
5. Board of Directors' Meetings	Once a Quarter
6. Special Purposes Such As: Contract Negotiations Economic Changes Other	As Required

To provide the forecasts for the uses specified in Table V the model was structured as a case study simulation model. This type of model enabled the flexibility and ease of use required. With inputs provided through the use of tables a number of case situations could be tested by merely changing the inputs included in the tables.

The model has proved to be an effective management tool that provides forecasts on a much faster and accurate basis than can be done manually. Besides these efficiencies, the model was designed to be a multi-purpose planning tool as was described in Table V.

IV. CONCLUSIONS

The design and implementation of the financial forecasting model for Fisher Controls Company proved to be very time consuming. As stated in an earlier section, it is important that the individual involved in the model development not become lost in all the details. It is also important that the model not be designed with all the complexities that could be incorporated. Too many details and requirements from others could result in a model that never reaches completion or one that takes so long to develop that it is out-of-date when finally implemented. Another key factor is to coordinate the model's design with the data processing department to assure that it will utilize the best computer techniques.

The Fisher model has been implemented and will eventually be expanded upon to provide even greater capabilities. This will be a continual requirement and is common to forecasting models. The speed and accuracy it provides and the uses it serves suggest that other companies might also improve their planning system by developing such a model.

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BIBLIOGRAPHY

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APPENDIX A

APPENDIX A

FISHER CONTROLS COMPANY
MARSHALLTOWN DIVISION
FINANCIAL MODEL
INPUT MATRIX ACCOUNTS
(PROFIT AND LOSS STATEMENT)

SUBACCOUNT NO.	DESCRIPTION
S001	Specialty sales without price.
S002	Part sales without price.
S003	ac^2 sales without price.
S004	dc^2 sales without price.
S005	Price change on specialties.
S006	Effective flow-through rate of price change on specialties.
S007	Price change on parts.
S008	Price change on ac^2 sales.
S009	Effective flow-through rate on ac^2 price change.
S010	Price change on dc^2 sales.
S011	Effective flow-through rate on dc^2 price change.
S012	Number of working days in month.
S013	Number of holidays in month.
S014	Number of weeks in month.
S015	Daily average for excess credit.
S016	Standard material cost of sales for specialty shipments as a percent of specialty sales without price.
S017	Standard material cost of sales on parts as a percent of parts sales.
S018	Standard material cost of sales on ac^2 as a percent of ac^2 sales without price.
S019	Standard material cost of sales on dc^2 as a percent of dc^2 sales without price.
S020	Standard labor machine shop cost of sales on specialties as a percent of specialty sales without price.
S021	Standard labor assembly cost of sales on specialties as a percent of specialty sales without price.
S022	Standard labor machine shop cost of sales on parts as a percent of parts sales.
S023	Standard labor cost of sales on ac^2 as a percent of ac^2 sales without price.
S024	Standard labor cost of sales on dc^2 as a percent of dc^2 sales without price.
S025	Standard burden machine shop cost of sales on specialties as a percent of specialty sales without price.
S026	Standard burden assembly cost of sales on specialties as a percent of specialty sales without price.
S027	Standard burden machine shop cost of sales on parts as a percent of parts sales without price.
S028	Standard material handling burden rate - VRC.
S029	Standard burden cost of sales on ac^2 as a percent of ac^2 sales without price.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S030	Standard material handling burden rate - ac^2.
S031	Standard burden cost of sales on dc^2 as a percent of dc^2 shipments without price.
S032	Standard material handling burden rate - dc^2.
S033	Provision for obsolete inventory rate.
S034	Daily rate for standard material transferred to McKinney.
S035	Daily rate for standard labor transferred to McKinney.
S036	Daily rate for standard burden transferred to McKinney.
S037	Rate of variance between standard material value and invoice material value of transfers to McKinney.
S038	Rate of variance between the standard labor value and the invoiced labor value on transfers to McKinney.
S039	Rate of variance between the standard burden value and the invoiced burden value of transfers to McKinney.
S040	Daily rate of miscellaneous standard labor output.
S041	Direct labor employment level at Governor Road.
S042	Direct labor employment level at Center Street.
S043	Number of hours in a work day.
S044	Vacation factor.
S045	Absenteeism factor.
S046	Standard labor shop output per elapsed hour.
S047	Relationship between machine shop standard labor output and machine shop standard burden output.
S048	Relationship between before inspection scrap standard labor and Governor Road output standard labor.
S049	Relationship between standard burden before inspection scrap and standard labor before inspection scrap.
S050	Relationship between standard material before inspection scrap and standard labor before inspection scrap.
S051	Standard material inventory purchases - VRC.
S052	Purchase price variance rate - VRC.
S053	Material inventory adjustment.
S054	Average direct labor wage rate per elapsed hour for Governor Road.
S055	Average direct labor wage rate per elapsed hour for Center Street.
S056	Rate of in-house loss of direct labor hours at Governor Road.
S057	Rate of in-house loss of direct labor hours at Center Street.
S058	Percentage of wage rate variance.
S059	Labor inventory adjustment.
S060	Indirect labor employment levels.
S061	Daily average rate per indirect labor employee.
S062	Maintenance employment level.
S063	Average daily wage rate per maintenance employee.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S064	Daily average maintenance charged to SARE and electronics.
S065	Non-exempt employment levels in Manufacturing.
S066	Average daily wage rate per non-exempt employee in manufacturing.
S067	Exempt employment level in manufacturing.
S068	Average weekly wage rate per exempt employee in manufacturing.
S069	Daily labor expense in manufacturing allocated to ac^2.
S070	Daily other expense in manufacturing allocated to ac^2.
S071	Daily labor expense in manufacturing allocated to dc^2.
S072	Daily other expense in manufacturing allocated to dc^2.
S073	Weekly gross vacation and holiday accrual for manufacturing.
S074	Weekly depreciation and amortization expense for manufacturing.
S075	Weekly power expense for manufacturing.
S076	Weekly utility expense for manufacturing.
S077	Weekly property tax expense for manufacturing.
S078	Weekly pension expense for manufacturing.
S079	Weekly service bonus expense for manufacturing.
S080	Weekly hospitalization insurance expense for manufacturing.
S081	Daily accounts payable and check register charges to manufacturing.
S082	FICA tax rate.
S083	Effectiveness of FICA tax rate in manufacturing.
S084	Unemployment tax rate.
S085	Unemployment tax effectiveness rate in manufacturing.
S086	Weekly rate for Workman's Compensation in manufacturing.
S087	Daily rate for screw machine scrap.
S088	Daily rate for sales scrap.
S089	Daily rate for spoilage.
S090	Weekly rate for transfers to inactive stock.
S091	Weekly rate for miscellaneous manufacturing expenses.
S092	Weekly expenses for Cost Centers C73 and C74.
S093	Burden inventory adjustment.
S094	Non-exempt employment levels in executive cost center.
S095	Average daily wage rate per non-exempt employee in executive.
S096	Exempt employment levels in executive.
S097	Average weekly wage rate per exempt employee in executive.
S098	Weekly labor expense allocated to ac^2 from executive.
S099	Weekly other expense allocated to ac^2 from executive.
S100	Weekly labor expense allocated to dc^2 from executive.
S101	Weekly other expense allocated to dc^2 from executive.
S102	Weekly depreciation expense, executive.
S103	Weekly contribution expense, executive.
S104	Weekly pension expense, executive.
S105	Weekly service bonus expense, executive.
S106	Weekly hospitalization insurance expense, executive.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S107	Weekly organization cost amortization, executive.
S108	Daily accounts payable and check register charged to executive.
S109	Weekly employee purchases charged to executive.
S110	FICA tax effectiveness rate in executive.
S111	Unemployment tax effectiveness rate in executive.
S112	Weekly rate for Workman's Compensation in executive.
S113	Professional service expense, executive.
S114	Arbitration expense, executive.
S115	Weekly rate of miscellaneous expenses in executive.
S116	Maintenance expense charged to Marketing as a percent of the total charged to SARE and electronics.
S117	Non-exempt employment levels in Marketing.
S118	Daily average wage rate per non-exempt employee in Marketing.
S119	Exempt employment levels in Marketing.
S120	Weekly average wage rate per exempt employee in Marketing.
S121	Weekly labor expense allocated to ac^2 from Marketing.
S122	Weekly other expense allocated to ac^2 from Marketing.
S123	Weekly labor expense allocated to dc^2 from Marketing.
S124	Weekly other expense allocated to dc^2 from Marketing.
S125	Weekly depreciation expense charged to Marketing.
S126	Weekly service bonus expense charged to Marketing.
S127	Weekly hospitalization insurance charged to Marketing.
S128	Weekly pension expense charged to Marketing.
S129	Daily accounts payable and check register charges to Marketing.
S130	FICA tax effectiveness rate in Marketing.
S131	Unemployment tax effectiveness rate in Marketing.
S132	Weekly miscellaneous expenses - Marketing.
S133	Exempt employment levels in International.
S134	Average weekly wage rate per exempt employee in International.
S135	Weekly labor expense allocated to ac^2 from International.
S136	Weekly other expense allocated to ac^2 from International.
S137	Weekly other labor expense allocated to dc^2 from International.
S138	Weekly other expense allocated to dc^2 from International.
S139	Weekly service bonus expense - International.
S140	Weekly hospitalization insurance - International.
S141	Weekly pension expense - International.
S142	Daily accounts payable and check register charges to International.
S143	FICA tax effectiveness rate in International.
S144	Unemployment tax effectiveness rate in International.
S145	Weekly miscellaneous expenses - International.
S146	Maintenance expense charged to Research as a percent of total maintenance charged to SARE and electronics.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S147	Non-exempt employment levels - Research.
S148	Average daily wage rate per non-exempt employee in Research.
S149	Exempt employment levels in Research.
S150	Average weekly wage rate per exempt employee in Research.
S151	Weekly labor expense allocated to ac^2 from Research.
S152	Weekly other expense allocated to ac_2 from Research.
S153	Weekly labor expense allocated to dc^2 from Research.
S154	Weekly other expense allocated to dc^2 from research.
S155	Weekly depreciation expense - Research.
S156	Weekly pension expense - Research.
S157	Weekly service bonus expense - Research.
S158	Weekly hospitalization insurance expense - Research.
S159	Daily accounts payable and check register charges to Research.
S160	FICA tax effectiveness rate in Research.
S161	Unemployment tax effectiveness rate in Research.
S162	Weekly Workman's Compensation expense - Research.
S163	Weekly miscellaneous expenses - Research.
S164	Maintenance expense charged to Engineering as a percent of total maintenance charged to SARE and electronics.
S165	Non-exempt employment levels - Engineering
S166	Average daily rate per non-exempt employee in Engineering.
S167	Exempt employment levels - Engineering.
S168	Average weekly wage rate per exempt employee in Engineering.
S169	Weekly labor expense allocated to ac^2 from Engineering.
S170	Weekly other expense allocated to ac^2 from Engineering.
S171	Weekly labor expense allocated to dc_2^2 from Engineering.
S172	Weekly other expense allocated to dc^2 from Engineering.
S173	Weekly pension expense charged to Engineering.
S174	Weekly service bonus expense - Engineering.
S175	Weekly hospitalization insurance expense - Engineering.
S176	Daily accounts payable and check register charges to Engineering.
S177	FICA tax effectiveness rate in Engineering.
S178	Unemployment tax effectiveness rate in Engineering.
S179	Weekly Workman's Compensation expense - Engineering.
S180	Weekly miscellaneous expense - Engineering.
S181	Non-exempt employment levels - Sales.
S182	Daily average wage rate per non-exempt employee - Sales.
S183	Exempt employment level - Sales.
S184	Average weekly wage rate per exempt employee in Sales.
S185	Weekly labor expenses allocated to ac^2 from Sales.
S186	Weekly other expenses allocated to ac^2 from Sales.
S187	Weekly labor expense allocated to dc^2 from Sales.
S188	Weekly other expenses allocated to dc^2 from Sales.
S189	Weekly pension expense - Sales
S190	Weekly service bonus expense - Sales.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S191	Weekly hospitalization insurance expense - Sales.
S192	Daily accounts payable and check register charges to Sales.
S193	Daily sales journal charges to Sales.
S194	FICA tax effectiveness rate in Sales.
S195	Unemployment tax effectiveness rate in Sales.
S196	Weekly Workman's Compensation expense - Sales.
S197	Weekly miscellaneous expenses - Sales.
S198	Average commission rate on parts.
S199	Average commission rate on specialties.
S200	Maintenance expense charged to Finance as a percent of total maintenance charged to SARE and electronics.
S201	Non-exempt employment levels - Finance.
S202	Daily average wage rate per non-exempt employee in Finance.
S203	Exempt employment levels - Finance.
S204	Weekly average wage rate per exempt employee in Finance.
S205	Weekly labor expense allocated to ac^2 from Finance.
S206	Weekly other expense allocated to ac^2 from Finance.
S207	Weekly labor expense allocated to dc^2 from Finance.
S208	Weekly other expense allocated to dc^2 from Finance.
S209	Weekly depreciation expense - Finance.
S210	Weekly insurance other expense - Finance.
S211	Weekly use tax expense - Finance.
S212	Weekly pension expense - Finance.
S213	Weekly service bonus expense - Finance.
S214	Weekly hospitalization insurance expense - Finance.
S215	Weekly product liability insurance - Finance.
S216	Daily accounts payable and check register charges to Finance.
S217	FICA tax effectiveness rate - Finance.
S218	Unemployment tax effectiveness rate - Finance.
S219	Weekly Workman's Compensation expense - Finance.
S220	Weekly bad debt expense - Finance.
S221	Weekly miscellaneous expenses - Finance.
S222	Weekly interest income.
S223	Weekly royalty income.
S224	Weekly corporate service fee income.
S225	Discount earned as a percent of actual inventory purchases.
S226	Gain on sale of fixed assets.
S227	Miscellaneous income.
S228	Monthly interest rate - Monsanto
S229	Weekly royalty expense.
S230	Miscellaneous expense.
S231	Weekly investment tax credit.
S232	Weekly deferred income tax credit.
S233	Standard material purchases - ac^2.
S234	Material purchase price variance rate - ac^2.
S235	Material inventory adjustment - ac^2.
S236	Direct labor employment level - ac^2.
S237	Average hourly rate per ac^2 direct labor employee.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S238	Standard hourly labor rate.
S239	Labor inventory adjustment - ac^2.
S240	Indirect labor employment level - ac^2.
S241	Average daily wage rate per ac^2 indirect labor employee.
S242	Maintenance expense charged to ac^2 as a percent of total maintenance expense charged to SARE and electronics.
S243	Non-exempt employment levels - ac^2 manufacturing.
S244	Daily average wage rate per ac^2 manufacturing non-exempt employee.
S245	Exempt employment levels - ac^2 manufacturing.
S246	Weekly average salary per exempt employee in ac^2 manufacturing.
S247	Weekly depreciation expense - ac^2 manufacturing.
S248	Weekly utility expense - ac^2 manufacturing.
S249	Weekly property tax expense - ac^2 manufacturing.
S250	Weekly pension expense - ac^2 manufacturing.
S251	Weekly service bonus expense - ac^2 manufacturing.
S252	Weekly hospitalization insurance expense - ac^2 manufacturing.
S253	Weekly gross vacation and holiday accrual - ac^2 manufacturing.
S254	Daily accounts payable and check register charges to ac^2 manufacturing.
S255	Daily spoiled work - ac^2 manufacturing.
S256	FICA tax effectiveness rate in ac^2 manufacturing.
S257	Unemployment tax effectiveness rate in ac^2 manufacturing.
S258	Weekly Workman's Compensation expense - ac^2 manufacturing.
S259	Weekly miscellaneous expenses - ac^2 manufacturing.
S260	Weekly other expenses - ac^2 manufacturing.
S261	Standard burden production - ac^2 - as a percent of standard labor production.
S262	Burden inventory adjustment - ac^2.
S263	Non-exempt employment levels - ac^2 marketing.
S264	Daily average wage rate per non-exempt employee in ac^2 marketing.
S265	Exempt employment levels - ac^2 marketing.
S266	Weekly average wage rate per exempt employee in ac^2 marketing.
S267	Weekly pension expense - ac^2 marketing.
S268	Weekly service bonus expense - ac^2 marketing.
S269	Weekly hospitalization insurance expense - ac^2 marketing.
S270	Daily accounts payable and check register charges to ac^2 marketing.
S271	FICA tax effectiveness rate in ac^2 marketing.
S272	Unemployment tax effectiveness rate in ac^2 marketing.
S273	Weekly Workman's Compensation expense - ac^2 marketing.
S274	Weekly miscellaneous expenses - ac^2 marketing.
S275	Non-exempt employment levels - ac^2 marketing.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S276	Daily average wage rate per non-exempt employee in ac^2 research.
S277	Exempt employment levels - ac^2 research.
S278	Weekly average wage rate per exempt employee in ac^2 research.
S279	Weekly pension expense - ac^2 research.
S280	Weekly service bonus expense - ac^2 research.
S281	Weekly hospitalization insurance expense - ac^2 research.
S282	Daily accounts payable and check register charges to ac^2 research.
S283	FICA tax effectiveness rate in ac^2 research.
S284	Unemployment tax effectiveness rate in ac^2 research.
S285	Weekly Workman's Compensation expense - ac^2 research.
S286	Weekly miscellaneous expense - ac^2 research.
S287	Non-exempt employment levels - ac^2 engineering.
S288	Daily average wage rate per non-exempt employee in ac^2 engineering.
S289	Exempt employment levels - ac^2 engineering.
S290	Weekly average wage rate per exempt employee in ac^2 engineering.
S291	Weekly pension expense - ac^2 engineering.
S292	Weekly service bonus expense - ac^2 engineering.
S293	Weekly hospitalization insurance expense - ac^2 engineering.
S294	Daily accounts payable and check register charges to ac^2 engineering.
S295	FICA tax effectiveness rate for ac^2 engineering.
S296	Unemployment tax effectiveness rate for ac^2 engineering.
S297	Weekly Workman's Compensation tax - ac^2 engineering.
S298	Weekly miscellaneous expenses - ac^2 engineering.
S299	Exempt employment levels - ac^2 sales.
S300	Weekly average wage rate per exempt employee in ac^2 sales.
S301	Weekly pension expense - ac^2 sales.
S302	Weekly service bonus expense - ac^2 sales.
S303	Weekly hospitalization insurance expense - ac^2 sales.
S304	Daily accounts payable and check register charges to ac^2 sales.
S305	FICA tax effectiveness rate for ac^2 sales.
S306	Unemployment tax effectiveness rate in ac^2 sales.
S307	Weekly Workman's Compensation tax - ac^2 sales.
S308	Weekly miscellaneous expenses - ac^2 sales.
S309	Commission rate on ac^2 sales.
S310	ac^2 royalty income.
S311	Standard material purchases - dc^2.
S312	Purchase price variance rate - dc^2.
S313	Material inventory adjustment - dc^2.
S314	dc^2 direct labor employment level.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S315	Average hourly wage rate for direct labor employees - dc^2.
S316	Standard hourly labor rate for dc^2.
S317	Labor inventory adjustment - dc^2.
S318	Indirect labor employment levels - dc^2 manufacturing.
S319	Average daily wage rate per indirect labor employee in dc^2 manufacturing.
S320	Maintenance charged to dc^2 manufacturing as a percent of total maintenance charged to SARE and electronics.
S321	Non-exempt employment levels - dc^2 manufacturing.
S322	Daily average wage rate per non-exempt employee in dc^2 manufacturing.
S323	Exempt employment levels - dc^2 manufacturing.
S324	Weekly average wage rate per exempt employee in dc^2 manufacturing.
S325	Weekly depreciation expense - dc^2 manufacturing.
S326	Weekly utility expense - dc^2 manufacturing.
S327	Weekly property tax expense - dc^2 manufacturing.
S328	Weekly pension expense - dc^2 manufacturing.
S329	Weekly service bonus expense - dc^2 manufacturing.
S330	Weekly hospitalization insurance expense - dc^2 manufacturing.
S331	Weekly gross vacation and holiday accrual - dc^2 manufacturing.
S332	Daily accounts payable and check register charges to dc^2 manufacturing.
S333	FICA tax effectiveness rate in dc^2 manufacturing.
S334	Unemployment tax effectiveness rate in dc^2 manufacturing.
S335	Weekly Workman's Compensation expense - dc^2 manufacturing.
S336	Weekly miscellaneous expenses - dc^2 manufacturing.
S337	Weekly other expenses - dc^2 manufacturing.
S338	dc^2 standard burden production as a percent of standard labor production.
S339	Burden inventory adjustment - dc^2.
S340	Non-exempt employment levels - dc^2 marketing.
S341	Daily average wage rate per non-exempt employee in dc^2 marketing.
S342	Exempt employment level - dc^2 marketing.
S343	Weekly average wage rate per exempt employee in dc^2 marketing.
S344	Weekly pension expense - dc^2 marketing.
S345	Weekly service bonus expense - dc^2 marketing.
S346	Weekly hospitalization insurance expense - dc^2 marketing.
S347	Daily accounts payable and check register charges to dc^2 marketing.
S348	FICA tax effectiveness rate - dc^2 marketing.
S349	Unemployment tax effectiveness rate - dc^2 marketing.
S350	Weekly Workman's Compensation expense - dc^2 marketing.
S351	Weekly miscellaneous expenses - dc^2 marketing.
S352	Non-exempt employment levels - dc^2 research.
S353	Daily average wage rate per non-exempt employee in dc^2 research.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S354	Exempt employment level - dc^2 research.
S355	Weekly average wage rate per exempt employee in dc^2 research.
S356	Weekly pension expense - dc^2 research.
S357	Weekly service bonus expense - dc^2 research.
S358	Weekly hospitalization insurance expense - dc^2 research.
S359	Daily accounts payable and check register charges to dc^2 research.
S360	FICA tax effectiveness rate - dc^2 research.
S361	Unemployment tax effectiveness rate - dc^2 research.
S362	Weekly Workman's Compensation - dc^2 research.
S363	Weekly miscellaneous expenses - dc^2 research.
S364	Non-exempt employment levels - dc^2 engineering.
S365	Daily average wage rate per non-exempt employee in dc^2 engineering.
S366	Exempt employment levels - dc^2 engineering.
S367	Weekly average wage rate per exempt employee in dc^2 engineering.
S368	Weekly pension expense - dc^2 engineering.
S369	Weekly service bonus expense - dc^2 engineering.
S370	Weekly hospitalization insurance expense - dc^2 engineering.
S371	Daily accounts payable and check register charges - dc^2 engineering.
S372	FICA tax effectiveness rate - dc^2 engineering.
S373	Unemployment tax effectiveness rate - dc^2 engineering.
S374	Weekly Workman's Compensation tax - dc^2 engineering.
S375	Weekly miscellaneous expenses - dc^2 engineering.
S376	Exempt employment levels - dc^2 sales.
S377	Weekly average wage rate per exempt employee in dc^2 sales.
S378	Weekly pension expense - dc^2 sales.
S379	Weekly service bonus expense - dc^2 sales.
S380	Weekly hospitalization insurance - dc^2 sales.
S381	Daily accounts payable and check register charges to dc^2 sales.
S382	FICA tax effectiveness rate - dc^2 sales.
S383	Unemployment tax effectiveness rate - dc^2 sales.
S384	Weekly Workman's Compensation tax - dc^2 sales.
S385	Weekly miscellaneous expense - dc^2 sales.
S386	Commission rate on dc^2 sales.
S387	Royalty income - dc^2.
S388	Royalty expense accrual rate - dc^2.
S389	Weekly gross vacation and holiday accrual - SARE.
S390	Percentage of variance on wage rate - ac^2.
S391	Percentage of variance on wage rate - dc^2.
S392	Annual vacation expense - manufacturing.

APPENDIX A - (continued)

SUBACCOUNT NO.	DESCRIPTION
S393	Monthly vacation expense as a percent of the annual.
S394	Annual vacation expense - manufacturing ac^2.
S395	Annual vacation expense - manufacturing dc^2.
S396	Annual vacation expense - SARE.
S397	Corporate Federal income tax rate.
S398	Weekly Manufacturing Portion - Employee Relations.
S399	Material as Percentage of total Spoilage.
S400	Material as Percentage of total Transfers - Inactive Stock.
S401	Weekly Amortization - Prior Year Adj. - Material.

APPENDIX B

APPENDIX B

FISHER CONTROLS COMPANY
MARSHALLTOWN DIVISION
FINANCIAL MODEL

FINAL

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
001	Specialty Sales-Without Price	S001
002	Parts Sales-Without Price	S002
003	Ac^2 Sales-Without Price	S003
004	Dc^2 Sales-Without Price	S004
005	Price Increase-Specialty	001 X S005 X S006
006	Price Increase-Parts	002 X S007
007	Price Increase-Ac^2	003 X S008 X S009
008	Price Increase-Dc^2	004 X S010 X S011
009	Excess Credit	S015 X S012
010	Standard Material COGS-Specialty	001 X S016
011	Standard Material COGS-Parts	002 X S017
012	Standard Material COGS-Ac^2	003 X S018
013	Standard Material COGS-Dc^2	004 X S019
014	Standard Labor COGS-Specialty-Machine Shop	001 X S020
015	Standard Labor COGS-Specialty-Assembly	001 X S021
016	Standard Labor COGS-Parts-Machine Shop	002 X S022
017	Standard Labor COGS-Ac^2	003 X S023

Note: Any Electronic accounts included in this mechanical section are identified as Ac^2 or Dc^2.

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
018	Standard Labor COGS-Dc^2	004 X S024
019	Standard Burden COGS-Specialty-Machine Shop	001 X S025
020	Standard Burden COGS-Specialty-Assembly	001 X S026
021	Standard Burden COGS-Parts-Machine Shop	002 X S027
022	Material Handling Burden - VRC	(010 + 011) S028
023	Standard Burden COGS-Ac^2	003 X S029
024	Material Handling Burden-Ac^2	012 X S030
025	Standard Burden COGS-Dc^2	004 X S031
026	Material Handling Burden-Dc^2	013 X S032
027	Provision for Obsolete Inventory-VRC	(010 + 011) S033
028	Provision for Obsolete Inventory-Ac^2	012 X S033
029	Provision for Obsolete Inventory-Dc^2	013 X S033
030	Transfers to McKinney-Standard-Material	S012 X S034
031	Transfers to McKinney-Standard-Labor	S012 X S035
032	Transfers to McKinney-Standard-Burden	S012 X S036
033	Variance on Transfers to McKinney	(030 X S037) + (031 X S038) + (032 X S039)
034	Direct Labor Employment Levels-Shop	S041

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
035	Standard Labor Output-Machine Shop	034 X S012 X S043 X S044 X S045 X S056 X S046
036	Direct Labor Employment Levels-Center Street	S042
037	Standard Labor Output-Miscellaneous	S012 X S040
038	Standard Burden Output-Machine Shop	035 X S047
039	Standard Burden Output-Miscellaneous	037 X S047
040	Before Inspection Scrap-Standard Labor	035 X S048
041	Before Inspection Scrap-Standard Burden	040 X S049
042	Before Inspection Scrap-Standard Material	040 X S050
043	Standard Material Purchases	S051
044	Purchase Price Variance	043 X S052
045	Material Inventory Adjustment	438 - 435 - 044 - 439
046	Direct Labor Spending-Shop	034 X S012 X S043 X S044 X S045) S056 X S054
047	Direct Labor Spending-Center Street	036 X S012 X S043 X S044 X S045) S057 X S055
048	Variance Labor	(046 + 047) S058
049	Labor Inventory Adjustment	S059
050	In-House Loss of Direct Labor	$(\frac{046}{S056} - 046) + (\frac{047}{S057} - 047)$
051	Indirect Labor Employment Levels	S060
052	Indirect Labor Spending-Manufacturing	051 X (S012 + S013) X S061

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical		
053	Indirect Labor-Manufacturing	$052+050+ \left/(046+047)\frac{S013}{S012}\right/ + \left/(034 X S012 X S043 X S054)+(036 X S012 X S043 X S055)\right/ X 1 - S044$
054	Maintenance Employment Levels	S062
055	Maintenance Spending-Manufacturing	054 X S063 (S012 + S013)
056	Maintenance Charged to SARE & Electronics	S064 X S012
057	Non-Exempt Employment Levels-Manufacturing	S065
058	Non-Exempt Spending-Manufacturing	057 X S066 (S012 + S013)
059	Exempt Employment Levels-Manufacturing	S067
060	Exempt Salaries-Manufacturing	059 X S014 X S068
061	Manufacturing Expense Allocated to Ac^2-Labor	S069 X S012
062	Manufacturing Expense Allocated to Ac^2-Other	S070 X S012
063	Manufacturing Expense Allocated to Dc^2-Labor	S071 X S012
064	Manufacturing Expense Allocated to Dc^2-Other	S072 X S012
065	Depreciation and Amortization Expense-Manufacturing	S074 X S014
066	Power Expense-Manufacturing	S075 X S014
067	Utility Expense-Manufacturing	S076 X S014
068	Property Tax Expense-Manufacturing	S077 X S014
069	Pension Expense-Manufacturing	S078 X S014
070	Service Bonus Expense-Manufacturing	S079 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
071	Hospitalization Insurance Expense-Manufacturing	S080 X S014
072	Vacation Expense-Manufacturing	S392 X S393
073	Holiday Expense-Manufacturing	$(046 + 047 + 053 + 055 + 058) \frac{S013}{S012 + S013}$
074	Net Vacation & Holiday Accrual-Manufacturing	(S014 X S073) - (072 + 073)
075	Accounts Payable and Check Register-Manufacturing	S081 X S012
076	FICA Tax-Manufacturing	S083 X S082 X (053 + 055 + 058 + 060 + 046 + 047)
077	Unemployment Tax-Manufacturing	S085 X S084 X (053 + 055 + 060 + 046 + 047)
078	Workman's Compensation-Manufacturing	S086 X S014
079	Screw Machine Scrap-Manufacturing	S087 X S012
080	Sale of Scrap	S088 X S012
081	Spoilage-Manufacturing	S089 X S012
082	Transfers to Inactive Stock	S090 X S014
083	Miscellaneous Expenses-Manufacturing	S091 X S014
084	Total Expenses-Cost Centers C73 & C74	S092 X S014
085	Burden Inventory Adjustment	S093
086	Non-Exempt Employment Levels Executive	S094
087	Non-Exempt Spending-Executive	086 X (S012 + S013) X S095
088	Exempt Employment Levels-Executive	S096

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
089	Exempt Salaries-Executive	088 X S097 X S014
090	Executive Expenses Allocated to Ac^2-Labor	S098 X S014
091	Executive Expenses Allocated to Ac^2-Other	S099 X S014
092	Executive Expenses Allocated to Dc^2-Labor	S100 X S014
093	Executive Expenses Allocated to Dc^2-Other	S101 X S014
094	Depreciation Expense-Executive	S102 X S014
095	Contributions Expense-Executive	S103 X S014
096	Pension Expense-Executive	S104 X S014
097	Service Bonus-Executive	S105 X S014
098	Hospitalization Insurance Expense-Executive	S106 X S014
099	Organization Cost Amortization	S107 X S014
100	Accounts Payable & Check Register-Executive	S108 X S012
101	Employee Purchases-Executive	S109 X S014
102	FICA Tax-Executive	(087 + 089) S110 X S082
103	Unemployment Tax-Executive	(087 + 089) S111 X S084
104	Workman's Compensation-Executive	S112 X S014
105	Professional Service-Executive	S113
106	Arbitration Expense-Executive	S114
107	Miscellaneous Expenses-Executive	S115 X S014
108	Maintenance Spending-Marketing	056 X S116

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
109	Non-Exempt Employment Levels-Marketing	S117
110	Non-Exempt Spending-Marketing	109 X (S012 + S013) X S118
111	Exempt Employment Levels-Marketing	S119
112	Exempt Salaries-Marketing	111 X S014 X S120
113	Marketing Expenses Allocated to Ac^2-Labor	S121 X S014
114	Marketing Expenses Allocated to Ac^2-Other	S122 X S014
115	Marketing Expenses Allocated to Dc^2-Labor	S123 X S014
116	Marketing Expenses Allocated to Dc^2-Other	S124 X S014
117	Depreciation Expense-Marketing	S125 X S014
118	Service Bonus-Marketing	S126 X S014
119	Hospitalization Insurance-Marketing	S127 X S014
120	Pension Expense-Marketing	S128 X S014
121	Accounts Payable & Check Register-Marketing	S129 X S012
122	FICA Tax-Marketing	S130 X S082 X (110 + 112)
123	Unemployment Tax-Marketing	S131 X S084 (110 + 112)
124	Miscellaneous Expenses-Marketing	S132 X S014
125	Exempt Employment Levels-International	S133
126	Exempt Spending-International	125 X S014 X S134

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
127	International Expenses Allocated to Ac^2-Labor	S135 X S014
128	International Expenses Allocated to Ac^2-Other	S136 X S014
129	International Expenses Allocated to Dc^2-Labor	S137 X S014
130	International Expenses Allocated to Dc^2-Other	S138 X S014
131	Service Bonus-International	S139 X S014
132	Hospitalization Insurance-International	S140 X S014
133	Pension Expense-International	S141 X S014
134	Accounts Payable & Check Register-International	S142 X S012
135	FICA Tax-International	126 X S082 X S143
136	Unemployment Tax-International	126 X S084 X S144
137	Miscellaneous Expenses-International	S145 X S014
138	Maintenance Spending-Research	056 X S146
139	Non-Exempt Employment Levels-Research	S147
140	Non-Exempt Spending-Research	139 X (S012 + S013) X S148
141	Exempt Employment Levels-Research	S149
142	Exempt Salaries-Research	141 X S014 X S150
143	Research Expenses Allocated to Ac^2-Labor	S151 X S014
144	Research Expenses Allocated to Ac^2-Other	S152 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
145	Research Expenses Allocated to Dc^2-Labor	S153 X S014
146	Research Expenses Allocated to Dc^2-Other	S154 X S014
147	Depreciation Expense-Research	S155 X S014
148	Pension Expense-Research	S156 X S014
149	Service Bonus Expense-Research	S157 X S014
150	Hospitalization Insurance Expense-Research	S158 X S014
151	Accounts Payable	S159 X S012
152	FICA Tax-Research	S160 X S082 (140 + 142)
153	Unemployment Tax-Research	S161 X S084 (140 + 142)
154	Workman's Compensation-Research	S162 X S014
155	Miscellaneous Expenses-Research	S163 X S014
156	Maintenance Labor Spending-Engineering	S164 X 056
157	Non-Exempt Employment Levels-Engineering	S165
158	Non-Exempt Spending-Engineering	157 X (S012 + S013) X S166
159	Exempt Employment Levels-Engineering	S167
160	Exempt Salaries-Engineering	159 X S014 X S168
161	Engineering Expenses Allocated to Ac^2-Labor	S169 X S014
162	Engineering Expenses Allocated to Ac^2-Other	S170 X S014
163	Engineering Expenses Allocated to Dc^2-Labor	S171 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
164	Engineering Expenses Allocated to Dc^2-Other	S172 X S014
165	Pension Expense-Engineering	S173 X S014
166	Service Bonus Expense-Engineering	S174 X S014
167	Hospitalization Expense-Engineering	S175 X S014
168	Accounts Payable & Check Register-Engineering	S176 X S012
169	FICA-Engineering	S177 X S082 X (158 + 160)
170	Unemployment Tax-Engineering	S178 X S084 X (158 + 160)
171	Workman's Compensation-Engineering	S179 X S014
172	Miscellaneous Expense-Engineering	S180 X S014
173	Non-Exempt Employment Levels-Sales	S181
174	Non-Exempt Spending-Sales	S182 X 173 X (S012 + S013)
175	Exempt Employment Levels-Sales	S183
176	Exempt Spending-Sales	175 X S014 X S184
177	Selling Expenses Allocated to Ac^2-Labor	S185 X S014
178	Selling Expenses Allocated to Ac^2-Other	S186 X S014
179	Selling Expenses Allocated to Dc^2-Labor	S187 X S014
180	Selling Expenses Allocated to Dc^2-Other	S188 X S014
181	Pension Expense-Sales	S189 X S014
182	Service Bonus-Sales	S190 X S014
183	Hospitalization Insurance Expense-Sales	S191 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
184	Accounts Payable & Check Register-Sales	S192 X S012
185	Sales Journal Charges-Sales	S193 X S012
186	FICA Tax-Sales	S194 X S082 X (174 + 176)
187	Unemployment Tax-Sales	S195 X S084 X (174 + 176)
188	Workman's Compensation-Sales	S196 X S014
189	Miscellaneous Expenses-Sales	S197 X S014
190	Commissions on Parts-Sales	S198 (002 + 006)
191	Commissions on Specialty Sales	S199 (001 + 005)
192	Maintenance Spending-Finance	S200 X 056
193	Non-Exempt Employment Levels-Finance	S201
194	Non-Exempt Spending-Finance	193 X (S012 + S013) X S202
195	Exempt Employment Levels-Finance	S203
196	Exempt Salaries-Finance	195 X S014 X S204
197	Finance Expense Allocated to Ac^2-Labor	S205 X S014
198	Finance Expense Allocated to Ac^2-Other	S206 X S014
199	Finance Expense Allocated to Dc^2-Labor	S207 X S014
200	Finance Expense Allocated to Dc^2-Other	S208 X S014
201	Depreciation Expense-Finance	S209 X S014
202	Insurance-Other-Finance	S210 X S014
203	Use Tax-Finance	S211 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
204	Pension Expense-Finance	S212 X S014
205	Service Bonus Expense-Finance	S213 X S014
206	Hospitalization Insurance Expense-Finance	S214 X S014
207	Product Liability Insurance-Finance	S215 X S014
208	Accounts Payable & Check Register-Finance	S216 X S012
209	FICA Tax-Finance	S217 X S082 X (194 + 196)
210	Unemployment Tax-Finance	S218 X S084 X (194 + 196)
211	Workman's Compensation Tax-Finance	S219 X S014
212	Bad Debt Expense-Finance	S220 X S014
213	Miscellaneous Expenses-Finance	S221 X S014
214	Interest Income	S222 X S014
215	Royalty Income	S223 X S014
216	Corporate Service Fee	S224 X S014
217	Discounts Earned	(043 + 044) S225
218	Gain on Sale of Fixed Assets	S226
219	Miscellaneous Income	S227
220	Interest Expense	S228
221	Royalty Expense	S229 X S014
222	Miscellaneous Expense	S230
223	Investment Tax Credit	S231 X S014
224	Deferred Income Tax Credit	S232 X S014
225		
226		

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
227		
228		
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238		
239		
240		
241	Standard Material Purchases-Ac^2	S233
242	Purchase Price Variance-Ac^2	241 X S234
243	Material Inventory Adjustment-Ac^2	S235
244	Ac^2 Direct Labor Employment Level	S236
245	Ac^2 Direct Labor Spending	244 X S012 X S043 X S044 X S045 X S237
246	Ac^2 Standard Labor Production	244 X S012 X S043 X S044 X S045 X S238
247	Variance Labor-Ac^2	245 X S390

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
248	Labor Inventory Adjustment-Ac^2	S239
249	Indirect Employment Levels-Ac^2 Manufacturing	S240
250	Indirect Labor Spending-Ac^2 Manufacturing	$\overline{249 \text{ X } (S012 + S013) \text{ X } S247} + \left(\frac{245 \text{ X } S013}{S012}\right) + 244 \text{ X } S012 \text{ X } S043 \text{ X } S237 \text{ X } (1\text{-}S044)$
251	Maintenance Labor Spending-Ac^2 Manufacturing	056 X S242
252	Non-Exempt Employment Levels-Ac^2 Manufacturing	S243
253	Non-Exempt Spending-Ac^2 Manufacturing	252 X S244 (S012 + S013)
254	Exempt Employment Levels-Ac^2 Manufacturing	S245
255	Exempt Salaries-Ac^2 Manufacturing	254 X S014 X S246
256	Depreciation Expense-Ac^2 Manufacturing	S247 X S014
257	Utility Expense-Ac^2 Manufacturing	S248 X S014
258	Property Tax-Ac^2 Manufacturing	S249 X S014
259	Pension Expense-Ac^2 Manufacturing	S250 X S014
260	Service Bonus Expense-Ac^2 Manufacturing	S251 X S014
261	Hospitalization Insurance Expense-Ac^2 Manufacturing	S252 X S014
262	Vacation Expense-Ac^2 Manufacturing	S394 X S393
263	Holiday Expense-Ac^2 Manufacturing	$(245 + 250 + 253 + 255)\frac{S013}{S012 + S013}$
264	Net Vacation & Holiday Accrual-Ac^2 Manufacturing	(S014 X S253)-(262 + 263)

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
265	Accounts Payable & Check Register-Ac^2 Manufacturing	S254 X S012
266	Spoiled Work-Ac^2 Manufacturing	S255 X S012
267	FICA Tax-Ac^2 Manufacturing	S256 X S082 X (245 + 250 + 253 + 255)
268	Unemployment Tax-Ac^2 Manufacturing	S257 X S084 X (245 + 250 + 253 + 255)
269	Workman's Compensation-Ac^2 Manufacturing	S258 X S014
270	Miscellaneous Expenses-Ac^2 Manufacturing	S259 X S014
271	Other Expenses-Ac^2 Manufacturing	S260 X S014
272	Standard Burden Production-Ac^2	246 X S261
273	Burden Inventory Adjustment-Ac^2	S262
274	Non-Exempt Employment Levels-Ac^2 Marketing	S263
275	Non-Exempt Spending-Ac^2 Marketing	274 X (S012 + S013) X S264
276	Exempt Employment Levels-Ac^2 Marketing	S265
277	Exempt Salaries-Ac^2 Marketing	276 X S014 X S266
278	Pension Expense-Ac^2 Marketing	S267 X S014
279	Service Bonus Expense-Ac^2 Marketing	S268 X S014
280	Hospitalization Insurance-Ac^2 Marketing	S269 X S014
281	Accounts Payable & Check Register-Ac^2 Marketing	S270 X S012
282	FICA Tax-Ac^2 Marketing	S271 X S082 X (275 + 277)

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
283	Unemployment Tax-Ac^2 Marketing	S272 X S082 X (275 + 277)
284	Workman's Compensation-Ac^2 Marketing	S273 X S014
285	Miscellaneous Expenses-Ac^2 Marketing	S274 X S014
286	Non-Exempt Employment Levels-Ac^2 Research	S275
287	Non-Exempt Spending-Ac^2 Research	286 X (S012 + S013) X S276
288	Exempt Employment Levels-Ac^2 Research	S277
289	Exempt Salaries-Ac^2 Research	S278 X S014 X 288
290	Pension Expense-Ac^2 Research	S279 X S014
291	Service Bonus Expense-Ac^2 Research	S280 X S014
292	Hospitalization Insurance-Ac^2 Research	S281 X S014
293	Accounts Payable & Check Register-Ac^2 Research	S282 X S012
294	FICA Tax-Ac^2 Research	S283 X S082 X (287 + 289)
295	Unemployment Tax-Ac^2 Research	S284 X S084 X (287 + 289)
296	Workman's Compensation-Ac^2 Research	S285 X S014
297	Miscellaneous Expenses-Ac^2 Research	S286 X S014
298	Non-Exempt Employment Levels-Ac^2 Engineering	S287
299	Non-Exempt Spending-Ac^2 Engineering	298 X (S012 + S013) X S288

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
300	Exempt Employment Levels-Ac^2 Engineering	S289
301	Exempt Salaries-Ac^2 Engineering	300 X S014 X S290
302	Pension Expense-Ac^2 Engineering	S291 X S014
303	Service Bonus Expense-Ac^2 Engineering	S292 X S014
304	Hospitalization Insurance Expense-Ac^2 Engineering	S293 X S014
305	Accounts Payable & Check Register-Ac^2 Engineering	S294 X S012
306	FICA Tax-Ac^2 Engineering	S295 X S082 X (299 + 301)
307	Unemployment Tax-Ac^2 Engineering	S296 X S084 X (299 + 301)
308	Workman's Compensation Tax-Ac^2 Engineering	S297 X S014
309	Miscellaneous Expenses-Ac^2 Engineering	S298 X S014
310	Exempt Employment Levels-Ac^2 Sales	S299
311	Exempt Salaries-Ac^2 Sales	310 X S014 X S300
312	Pension Expense-Ac^2 Sales	S301 X S014
313	Service Bonus Expense-Ac^2 Sales	S302 X S014
314	Hospitalization Insurance-Ac^2 Sales	S303 X S014
315	Accounts Payable & Check Register-Ac^2 Sales	S304 X S012
316	FICA Tax-Ac^2 Sales	S305 X S082 X 311
317	Unemployment Tax-Ac^2 Sales	S306 X S084 X 311

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
318	Workman's Compensation Tax-Ac^2 Sales	S307 X S014
319	Miscellaneous Expenses-Ac^2 Sales	S308 X S014
320	Commissions on Ac^2 Sales	S309 X (003 + 007)
321	Royalty Income-Ac^2	S310
322		
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APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
341	Standard Material Purchases-Dc^2	S311
342	Purchase Price Variance-Dc^2	S312 X 341
343	Material Inventory Adjustment-Dc^2	S313
344	Dc^2 Direct Labor Employment Level	S314
345	Dc^2 Direct Labor Spending	344 X S012 X S043 X S044 X S045 X S315
346	Dc^2 Standard Labor Production	344 X S012 X S043 X S044 X S045 X S316
347	Variance Labor-Dc^2	345 X S391
348	Labor Inventory Adjustment-Dc^2	S317
349	Indirect Employment Levels-Dc^2 Manufacturing	S318
350	Indirect Labor Spending-Dc^2 Manufacturing	$349 \times (S012+S013) \times S319 + \frac{(245 \times S013)}{S012} + 344 \times S012 \times S043 \times S315 \times (1 - S044)$
351	Maintenance Labor Spending-Dc^2 Manufacturing	S320 X 056
352	Non-Exempt Employment Levels-Dc^2 Manufacturing	S321
353	Non-Exempt Spending-Dc^2 Manufacturing	352 X (S012 + S013) X S322
354	Exempt Employment Levels-Dc^2 Manufacturing	S323
355	Exempt Salaries-Dc^2 Manufacturing	354 X S324 X S014
356	Depreciation Expense-Dc^2 Manufacturing	S325 X S014
357	Utility Expense-Dc^2 Manufacturing	S326 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
358	Property Tax-Dc^2 Manufacturing	S327 X S014
359	Pension Expense-Dc^2 Manufacturing	S328 X S014
360	Service Bonus Expense-Dc^2 Manufacturing	S329 X S014
361	Hospitalization Insurance Expense-Dc^2 Manufacturing	S330 X S014
362	Vacation Expense-Dc^2 Manufacturing	S395 X S393
363	Holiday Expense-Dc^2 Manufacturing	$(345 + 350 + 353) \frac{S013}{S012 + S013}$
364	Net Vacation & Holiday Accrual-Dc^2 Manufacturing	(S014 X S331)-(362 + 363)
365	Accounts Payable & Check Register-Dc^2 Manufacturing	S332 X S012
366	FICA Tax-Dc^2 Manufacturing	S333 X S082 X (345 + 350 + 353 + 355)
367	Unemployment Tax-Dc^2 Manufacturing	S334 X S084 X (345 + 350 + 353 + 355)
368	Workman's Compensation-Dc^2 Manufacturing	S335 X S014
369	Miscellaneous Expenses-Dc^2 Manufacturing	S336 X S014
370	Other Expenses-Dc^2 Manufacturing	S337 X S014
371	Standard Burden Production-Dc^2	S338 X 346
372	Burden Inventory Adjustment-Dc^2	S339
373	Non-Exempt Employment Levels-Dc^2 Marketing	S340
374	Non-Exempt Spending-Dc^2 Marketing	373 X (S012 + S013) X S341
375	Exempt Employment Levels-Dc^2 Marketing	342

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
376	Exempt Salaries-Dc^2 Marketing	375 X S014 X S343
377	Pension Expense-Dc^2 Marketing	S344 X S014
378	Service Bonus Expense-Dc^2 Marketing	S345 X S014
379	Hospitalization Insurance Expense-Dc^2 Marketing	S346 X S014
380	Accounts Payable & Check Register-Dc^2 Marketing	S347 X S012
381	FICA Tax-Dc^2 Marketing	S348 X S082 X (374 + 376)
382	Unemployment Tax-Dc^2 Marketing	S349 X S084 X (374 + 376)
383	Workman's Compensation-Dc^2 Marketing	S350 X S014
384	Miscellaneous Expenses-Dc^2 Marketing	S351 X S014
385	Non-Exempt Employment Levels-Dc^2 Research	352
386	Non-Exempt Spending-Dc^2 Research	385 X (S012 + S013) X S353
387	Exempt Employment Levels-Dc^2 Research	S354
388	Exempt Salaries-Dc^2 Research	387 X S014 X S355
389	Pension Expense-Dc^2 Research	S356 X S014
390	Service Bonus Expense-Dc^2 Research	S357 X S014
391	Hospitalization Insurance-Dc^2 Research	S358 X S014
392	Accounts Payable & Check Register-Dc^2 Research	S359 X S012
393	FICA Tax-Dc^2 Research	S360 X S082 X (386 + 388)
394	Unemployment Tax-Dc^2 Research	S361 X S084 X (386 + 388)
395	Workman's Compensation-Dc^2 Research	S362 X S014

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
396	Miscellaneous Expenses-Dc^2 Research	S363 X S014
397	Non-Exempt Employment Levels-Dc^2 Engineering	S364
398	Non-Exempt Spending-Dc^2 Engineering	397 X (S012 + S013) X S365
399	Exempt Employment Levels-Dc^2 Engineering	S366
400	Exempt Salaries-Dc^2 Engineering	399 X S014 X S367
401	Pension Expense-Dc^2 Engineering	S368 X S014
402	Service Bonus Expense-Dc^2 Engineering	S369 X S014
403	Hospitalization Insurance Expense-Dc^2 Engineering	S370 X S014
404	Accounts Payable & Check Register-Dc^2 Engineering	S371 X S012
405	FICA Tax-Dc^2 Engineering	S372 X S082 X (398 + 400)
406	Unemployment Tax-Dc^2 Engineering	S373 X S084 X (398 + 400)
407	Workman's Compensation Tax-Dc^2 Engineering	S374 X S014
408	Miscellaneous Expenses-Dc^2 Engineering	S375 X S014
409	Exempt Employment Levels-Dc^2 Sales	S376
410	Exempt Salaries-Dc^2 Sales	409 X S014 X S377
411	Pension Expense-Dc^2 Sales	S378 X S014
412	Service Bonus Expense-Dc^2 Sales	S379 X S014
413	Hospitalization Insurance-Dc^2 Sales	S380 X S014
414	Accounts Payable & Check Register-Dc^2 Sales	S381 X S012

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
415	FICA Tax-Dc^2 Sales	S382 X S082 X 410
416	Unemployment Tax-Dc^2 Sales	S383 X S084 X 410
417	Workman's Compensation Tax-Dc^2 Sales	S384 X S014
418	Miscellaneous Expenses -Dc^2 Sales	S385 X S014
419	Commissions on Dc^2 Sales	S386 (004 + 008)
420	Royalty Income-Dc^2	S387
421	Royalty Expense Accrual-Dc^2	S388 (004 + 008)
422	Total Depreciation Expense	065 + 094 + 117 + 147 + 201 + 256 + 356
423	Daily Ave. Barg. Unit Payroll	(046 + 047 + 053 + 055 + 245 + 250 + 345 + 350) ÷ (S012 + S013)
424	Daily Ave. Non-Exempt Payroll	(058+087+110+140+158+174+194+253+275+287+299+353+374+386+398) ÷ (S012 + S013)
425	Weekly Ave. Exempt Payroll	(060+089+112+126+142+160+176+196+255+277+289+301+311+355+376+388+400+410) ÷ S014
426	Accrued Vacation & Holiday Expense-Weekly	S073 + S253 + S331 + S389
427	Total Vacation Expense	(S392 + S394 + S395 + S396) S393
428	Total Bonus & Pension Expense	069+070+096+097+118+120+131+133+148+149+165+166+181+182+204+205+259+260+278+279+302+303+312+313+359+360+377+378+389+390+401+402+411+412
429	Total Property Tax Expense	068 + 258 + 358
430	Total Hospitalization Expense	071+098+119+132+150+167+183+206+261+280+292+304+314+361+379+391+403+413

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
431	Total Number of Employees	034+036+054+057+059+086+088+109+111+125+139+141+157+159+173+175+193+195+244+249+252+254+274+276+286+288+298+300+310+344+349+352+354+373+375+385+387+397+399+409
432	Additions to Inventory	035+037+040+043+044+038+039+041+241+242+246+272+341+342+346+371+042
433	Reliefs from Inventory	021 + 023 + 025 + 027 + 028 + 029 + 030 + 031 + 032 + 045 + 049 + 079 + 081 + 082 + 085 + 243 + 248 + 266 + 273 + 343 + 348 + 372 + 010 + 011 + 012 + 013 + 014 + 016 + 017 + 018 + 019
434-440	Reference page 112	
441	Sundry Expense Accrual	$(S014 \times S389) - (S396 \times S393) - (087 + 110 + 140 + 158 + 174 + 194 + 275 + 287 + 299 + 374 + 386 + 398) \frac{S013}{S012 + S013}$
442	Federal Corporate Tax Rate	S397

APPENDIX B - (continued)

SUBACCOUNT	DESCRIPTION	FORMULA
Mechanical:		
434	Manufacturing Portion - Employee Relations	S398 X S014
435	Standard Reliefs from Inventory	010 + 011 + 027 + 030 + 079 + (081 X S399) + (082 X S400)
436	Ending Balance - Standard Material Inventory	436_{T-1} + 043 - 435
437	Ending Balance - Adj. Material Inventory	437_{T-1} + 043 + 044 - $(\frac{437_{T-1}}{436_{T-1}}$ 435)
438	Adj. Reliefs from Material Inventory Reliefs	435 X $\frac{437_{T-1}}{436_{T-1}}$
439	Monthly Amortization Prior Year Adj.-Material	S041 X S014

APPENDIX C

APPENDIX C

FISHER CONTROLS COMPANY
PROFIT FORECAST
VRC

Account	Description	Formula
D01	Sales	001 + 002 + 005 + 006 + 009
	Cost of Goods Sold:	
	Material:	
D02	Material-Std.	010 + 011
D03	Purchase Price Var.	044
D04	Prov.-Obsol. Inv.	027
D05	Inventory Adjustment	045
D06	Total Material	D02 + D03 + D04 + D05
	Labor:	
D07	Labor-Std.	014 + 015 + 016
D08	Variance Labor	048
D09	Direct Labor Spending	046 + 047
D08	Less Variance Labor	048
D10	Std. Output Labor	015 + 035 + 037 + 040
D11	Inventory Adjustment	049
D12	Unabsorbed Labor	D09 - D08 - D10 ± D11
D13	Total Labor	D07 + D08 + D12
	Burden:	
D14	Burden-Std.	019 + 020 + 021 + 022
D15	Indir. Labor & Maint.	053 + 055 - 056
D16	Wages & Salaries	058 + 060 - 061 - 063
D17	Fixed Expenses	065 + 066 + 067 + 068 + 069 + 070 + 071
D18	Other Expenses	074 + 075 + 076 + 077 + 078 + 079 + 080 + 081 + 082 + 083 - 062 - 064+ 434+033
D19	Std. Output Burden	020 + 022 + 038 + 039 + 041
D20	Inventory Adjustment	085
D21	Burden Variance	D15 + D16 + D17 + D18 - D19 ± D20
D22	Total Burden	D14 + D21
D23	Total Cost of Goods Sold	D06 + D13 + D22
D24	Gross Profit	D01 - D23
	SAKE:	
	Executive:	
D25	Wages & Salaries	087 + 089 - 090 - 092
D26	Other	094 Thru 107 - 091 - 093 - 434
D27	Total Executive	D25 + D26

APPENDIX C - (continued)

Account	Description	Formula
	Marketing:	
D28	Wages & Salaries	110 + 112 - 113 - 115
D29	Other	108 + 117 thru 124 - 114 - 116
D30	Total Marketing	D28 + D29
	International:	
D31	Wages & Salaries	126 - 127 - 129
D32	Other	131 thru 137 - 128 - 130
D33	Total International	D31 + D32
	Research:	
D34	Wages & Salaries	140 + 142 - 143 - 145
D35	Other	147 thru 155 - 144 - 146
D36	Total Research	D34 + D35
	Engineering:	
D37	Wages & Salaries	158 + 160 - 161 - 163
D38	Other	156 + 165 thru 172 - 162 - 164
D39	Total Engineering	D37 + D38
	Sales:	
D40	Wages & Salaries	174 + 176 - 177 - 179
D41	Commissions	190 + 191
D42	Other	181 thru 189 - 178 - 180
D43	Total Sales	D40 + D41 + D42
	Finance:	
D44	Wages & Salaries	194 + 196 - 197 - 199
D45	Other	192 + 201 thru 213 - 198 - 200
D46	Total Finance	D44 + D45
D47	Sundry Expense Accrual	441
D48	Total SARE	D27 + D30 + D33 + D36 + D39 + D43 + D46 + D47
D49	Operating Income	D24 - D48
D50	Other Income	214 thru 219
D51	Other Expense	220 thru 222
D52	Income Before Tax	D49 + D50 - D51
D53	Taxes	442 X D52
D54	Tax Credits	223 + 224
D55	Net Income	D52 - D53 + D54

APPENDIX C - $\frac{(\text{continued})}{ac^2}$

Account	Description	Formula
E01	Sales	003 + 007
	Cost of Goods Sold:	
	Material:	
E02	Material-Std.	012
E03	Purchase Price Var.	242
E04	Prov.-Obsol. Inv.	028
E05	Inventory Adjustment	243
E06	Total Material	E02 + E03 + E04 + E05
	Labor:	
E07	Labor-Std.	017
E08	Variance Labor	247
E09	Direct Labor Spending	245
E08	Less Variance Labor	247
E10	Std. Output Labor	246
E11	Inventory Adjustment	248
E12	Unabsorbed Labor	E09 - E08 - E10 $\pm$ E11
E13	Total Labor	E07 + E08 + E12
	Burden:	
E14	Burden-Std.	023 + 024
E15	Indir. Labor & Maint.	250 + 251
E16	Wages & Salaries	253 + 255 + 061
E17	Fixed Expenses	256 thru 261
E18	Other Expenses	264 thru 271 + 062 + 024
E19	Std. Output Burden	272 + 024
E20	Inventory Adjustment	273
E21	Burden Variance	E15 + E16 + E17 + E18 - E19 $\pm$ E20
E22	Total Burden	E14 + E21
E23	Total Cost of Goods Sold	E06 + E13 + E22
E24	Gross Profit	E01 - E23
	SARE:	
	Executive:	
E25	Wages & Salaries	090
E26	Other	091
E27	Total Executive	E25 + E26
	Marketing:	
E28	Wages & Salaries	275 + 277 + 113
E29	Other	278 thru 285 + 114
E30	Total Marketing	E28 + E29

APPENDIX C - $\frac{}{ac^2}$ (continued)

Account	Description	Formula
	International:	
E31	Wages & Salaries	127
E32	Other	128
E33	Total International	E31 + E32
	Research:	
E34	Wages & Salaries	287 + 289 + 143
E35	Other	290 thru 297 + 144
E36	Total Research	E34 + E35
	Engineering:	
E37	Wages & Salaries	299 + 301 + 161
E38	Other	302 thru 309 + 162
E39	Total Engineering	E37 + E38
	Sales:	
E40	Wages & Salaries	311 + 177
E41	Commissions	320
E42	Other	312 thru 319 + 178
E43	Total	E40 + E41 + E42
	Finance:	
E44	Wages & Salaries	197
E45	Other	198
E46	Total Finance	E44 + E45
E47	Sundry Expense Accrual	--
E48	Total SARE	E27 + E30 + E33 + E36 + E39 + E43 + E46 + E47
E49	Operating Income	E24 - E48
E50	Other Income	321
E51	Other Expense	--
E52	Income Before Tax	E49 + E50 - E51
E53	Income Tax	442 X E52
E54	Investment Credit	--
E55	Net Income	E52 - E53 + E54

APPENDIX C - dc^2 (continued)

Account	Description	Formula
F01	Sales	004 + 008
	Cost of Goods Sold:	
	Material:	
F02	Material-Std.	013
F03	Purchase Price Var.	342
F04	Prov.-Obsol. Inv.	029
F05	Inventory Adjustment	343
F06	Total Material	F02 + F03 + F04 + F05
	Labor:	
F07	Labor-Std.	018
F08	Variance Labor	347
F09	Direct Labor Spending	345
F08	Less Variance Labor	347
F10	Std. Output Labor	346
F11	Inventory Adjustment	348
F12	Unabsorbed Labor	F09 - F08 - F10 ± F11
F13	Total Labor	F07 + F08 + F12
	Burden:	
F14	Burden-Std.	025 + 026
F15	Indir. Labor & Maint.	350 + 351
F16	Wages & Salaries	353 + 355 + 063
F17	Fixed Expenses	356 thru 361
F18	Other Expenses	364 thru 370 + 064 + 026
F19	Std. Output Burden	371 + 026
F20	Inventory Adjustment	372
F21	Burden Variance	F15 + F16 + F17 + F18 - F19 ± F20
F22	Total Burden	F14 + F21
F23	Total Cost of Goods Sold	F06 + F13 + F22
F24	Gross Profit	F01 - F23
	SARE:	
	Executive:	
F25	Wages & Salaries	092
F26	Other	093
F27	Total Executive	F25 + F26
	Marketing:	
F28	Wages & Salaries	374 + 376 + 115
F29	Other	377 thru 384 + 116
F30	Total Marketing	F28 + F29
	International:	
F31	Wages & Salaries	129
F32	Other	130
F33	Total International	F31 + F32

APPENDIX C - dc^2 (continued)

Account	Description	Formula
	Research:	
F34	Wages & Salaries	386 + 388 + 145
F35	Other	389 thru 396 + 146
F36	Total Research	F34 + F35
	Engineering:	
F37	Wages & Salaries	398 + 400 + 163
F38	Other	401 thru 408 + 164
F39	Total Engineering	F37 + F38
	Sales:	
F40	Wages & Salaries	410 + 179
F41	Commissions	419
F42	Other	411 thru 418 + 180
F43	Total Sales	F40 + F41 + F42
	Finance:	
F44	Wages & Salaries	199
F45	Other	200
F46	Total Finance	F44 + F45
F47	Sundry Expense Accrual	--
F48	Total SARE	F27 + F30 + F33 + F36 + F39 + F43 + F46 + F47
F49	Operating Income	F24 - F48
F50	Other Income	420
F51	Other Expense	421
F52	Income Before Tax	F49 + F50 - F51
F53	Taxes	442 X F52
F54	Tax Credits	--
F55	Net Income	F52 - F53 + F54

APPENDIX D

APPENDIX D

FISHER CONTROLS COMPANY
PROFIT FORECAST
TOTAL

Account	Description	Formula
C01	Sales	D01 + E01 + F01
	Cost of Goods Sold:	
	Material:	
C02	Material-Standard	D02 + E02 + F02
C03	Purchase Price Variance	D03 + E03 + F03
C04	Prov.-Obsolete Inventory	D04 + E04 + F04
C05	Inventory Adjustment	D05 + E05 + F05
C06	Total Material	D06 + E06 + F06
	Labor:	
C07	Labor-Standard	D07 + E07 + F07
C08	Variance Labor	D08 + E08 + F08
C09	Direct Labor Spending	D09 + E09 + F09
C08	Less Variance Labor	D08 + E08 + F08
C10	Standard Output Labor	D10 + E10 + F10
C11	Inventory Adjustment	D11 + E11 + F11
C12	Unabsorbed Labor	D12 + E12 + F12
C13	Total Labor	D13 + E13 + F13
	Burden:	
C14	Burden-Standard	D14 + E14 + F14
C15	Indirect Labor & Maintenance	D15 + E15 + F15
C16	Wages & Salaries	D16 + E16 + F16
C17	Fixed Expenses	D17 + E17 + F17
C18	Other Expenses	D18 + E18 + F18
C19	Standard Output Burden	D19 + E19 + F19
C20	Inventory Adjustment	D20 + E20 + F20
C21	Burden Variance	D21 + E21 + F21
C22	Total Burden	D22 + E22 + F22
C23	Total Cost of Goods Sold	D23 + E23 + F23
C24	Gross Profit	D24 + E24 + F24
	SARE:	
	Executive	
C25	Wages & Salaries	D25 + E25 + F25
C26	Other	D26 + E26 + F26
C27	Total Executive	D27 + E27 + F27

APPENDIX D - (continued)

Account	Description	Formula
	Marketing:	
C28	Wages & Salaries	D28 + E28 + F28
C29	Other	D29 + E29 + F29
C30	Total Marketing	D30 + E30 + F30
	International:	
C31	Wages & Salaries	D31 + E31 + F31
C32	Other	D32 + E32 + F32
C33	Total International	D33 + E33 + F33
	Research:	
C34	Wages & Salaries	D34 + E34 + F34
C35	Other	D35 + E35 + F35
C36	Total Research	D36 + E36 + F36
	Engineering:	
C37	Wages & Salaries	D37 + E37 + F37
C38	Other	D38 + E38 + F38
C39	Total Engineering	D39 + E39 + F39
	Sales:	
C40	Wages & Salaries	D40 + E40 + F40
C41	Commissions	D41 + E41 + F41
C42	Other	D42 + E42 + F42
C43	Total Sales	D43 + E43 + F43
	Finance:	
C44	Wages & Salaries	D44 + E44 + F44
C45	Other	D45 + E45 + F45
C46	Total Finance	D46 + E46 + F46
C47	Sundry Expense Accrual	D47 + E47 + F47
C48	Total SARE	D48 + E48 + F48
C49	Operating Income	D49 + E49 + F49
C50	Other Income	D50 + E50 + F50
C51	Other Expense	D51 + E51 + F51
C52	Income Before Tax	D52 + E52 + F52
C53	Taxes	D53 + E53 + F53
C54	Tax Credits	D54 + E54 + F54
C55	Net Income	D55 + E55 + F55

APPENDIX E

APPENDIX E

FISHER CONTROLS COMPANY
MARSHALLTOWN DIVISION
Accounts-Input Matrix
(Cash Forecast)

Subaccount	Description
T001	Number calendar days
T002	Number work days
T003	Number weeks
T004	Weekly amortization expense
T005	Federal tax payments from divisions
T006	State tax payments from divisions
T007	Working days in lag between Bargaining unit paid & earned schedule
T008	Working days in lag between Non-Exempt paid & earned schedule
T009	Weeks lag between Exempt paid & earned schedule
T010	Pension & Service Bonus payments
T011	Holidays paid - Bargaining unit
T012	Holidays paid - Non-Exempt
T013	Interest Payment
T014	Payment of contributions
T015	Number weeks paid for which no fed withholding taxes were deposited--Bargaining unit
T016	- Exempt & Non-Exempt
T017	Number weeks earned for which no fed withholding taxes were deposited--Bargaining
T018	- Non-Exempt
T019	- Exempt
T020	Federal personal income tax withholding rate - Bargaining unit
T021	Federal personal income tax withholding rate - Non-Exempt
T022	Federal personal income tax withholding rate - Exempt
T023	FICA Tax effectiveness rate for Non-Exempt
T024	FICA tax effectiveness rate for Exempt
T025	Number of days paid Bargaining unit but for which no state taxes were deposited
T026	Number of weeks paid Exempt but for which no state taxes were deposited
T027	State personal income tax withholding rate - Bargaining unit
T028	State personal income tax withholding rate - Non-Exempt
T029	State personal income tax withholding rate - Exempt
T030	Property Tax payment
T031	Sales Tax withheld as % of sales
T032	Royalty payment
T033	Daily Average vouchered for inventory, capital & expense items
T034	Change in number of vouchering days between pay date (the 25th) and month-end from prior month
T035	Hospitalization cost per employee factor

APPENDIX E - (continued)

Subaccount	Description
T036	Change in miscellaneous payables
T037	Investment liquidation
T038	Sale of fixed assets
T039	Accounts Payable - Baton Rouge
T040	Accounts Payable - Coraopolis
T041	Accounts Payable - McKinney
T042	Accounts Payable - Cornwall
T043	Accounts Payable - Toluca
T044	Accounts Payable - Woodstock
T045	Accounts Payable - Monsanto
T046	Other sources
T047	Annual pension expense - Marshalltown
T048	Annual pension expense - Coraopolis
T049	Annual pension expense - McKinney
T050	Annual pension contribution
T051	Excess of tax over book depreciation
T052	Annualization factor for income before tax
T053	Pennsylvania State Tax
T054	McKinney income before tax
T055	Coraopolis income before tax
T056	Percent of annual payment due
T057	Percent of current year liability to be paid in current year
T058	Prior year payment
T059	Periods income before tax involved
T060	Federal tax rate
T061	Payment of Pennsylvania State Tax
T062	Asset purchases
T063	Use tax rate
T064	Portion of sales taxes payable in following month
T065	Portion of sales taxes payable in following month following end on quarter
T066	Days supply outstanding
T067	Miscellaneous Accounts Receivable
T068	Prepaid Insurance
T069	Investments
T070	Other uses
T071	Accounts Receivable - Baton Rouge
T072	Accounts Receivable - Coraopolis
T073	Accounts Receivable - McKinney
T074	Accounts Receivable - Cornwall
T075	Accounts Receivable - Toluca

APPENDIX E - (continued)

Subaccount	Description
T076	Accounts Receivable - Woodstock
T077	Accounts Receivable - Inter Monsanto
T078	Accounts Receivable - Intra Monsanto
T079	Investment - Coraopolis
T080	Investment - McKinney
T081	Investment - Woodstock
T082	Investment - Toluca
T083	Investment - Nippon
T084	Investment - DIMA
T085	Investment - Baton Rouge
T086	Number of days paid Non-Exempt for which no state taxes were deposited

APPENDIX F

APPENDIX F

FISHER CONTROLS COMPANY
MARSHALLTOWN DIVISION
CASH FORECAST

Account	Description	Sources: Formula
H01	Net Income Before Tax	C52
H02	Amortization	T003 X T004
H03	Depreciation	422 - H02
H04	Tax Payments from Divisions	T005 + T006
H05	Wage & Salary Accrual	T007 X 423 + T008 X 424 + T009 X 425 - $H05_{T-1}$
H06	Bonus & Pension Accrual	428 + $H06_{T-1}$ - T010
H07	Vacation & Holiday Accrual	426 X T003 - T011 X 423 - T012 X 424 - 427
H08	Bonus, Pension, Vacation & Holiday Accrual	H06 + H07
H09	Interest Payable	220 - T013
H10	Contributions Accrual	095 - T014
H11	Federal Personal Income Tax Withholding Accrual	T015 X T020 X 423 + T016 X T021 X 424 + T016 X T022 X 425
H12	FICA Withholding Accrual	(T015 + T017) X S083 X S082 X 423 + (T016 + T018) X T023 X S082 X 424 + (T016 + T019) X T024 X S082 X 425
H13	State Withholding Accrual	T025 X T027 X 423 + T026 X T029 X 425 + T086 + T028 X 424
H14	Withholding Tax Accrual	H11 + H12 + H13 - $H14_{T-1}$
H15	Property Tax Accrual	429 - T030
H16	Sales & Use Tax Accrual	C01 X T031 + T055 X T056
H17	Accrued Royalties Payable	221 - T032

APPENDIX F - (continued)

Account	Description	Formula
H18	Trade Creditors - A/P	T033 X T034
H19	Commissions Payable	$C42 - C42_{T-2}$
H20	Accrued Hospitalization	$430 - (431_{T-1}$ X T035)
H21	Misc. Payables	T036
H22	Investment Liquidation	T037
H23	Sale of Fixed Assets	T038
H24	Baton Rouge	T039
H25	Coraopolis	T040
H26	Accounts Payable - McKinney	T041
H27	Accounts Payable - Cornwall	T042
H28	Accounts Payable - Toluca	T043
H29	Accounts Payable - Woodstock	T044
H30	Accounts Payable - Monsanto	T045
H31	Other Sources	T046
H32	Sub-Total Sources	H01 + H02 + H03 + H04 + H05 + H08 + H09 + H10 + H14 + H15 + H16 + H17 + H18 + H19 + H20 + H21 + H22 + H23 + H24 + H25 + H26 + H27 + H28 + H29 + H30 + H31
H33	Cash	I31 - H32
H34	Total Sources	H32 + H33
I01	Tax Payments	/(C52+T059 + T054 + T055) T052 + T047 + T048 + T049 - T050 - T0517 T060 X T057 X T056 - $I01_{T-1}$ + T058 + T061
I02	Sales & Use Tax Payments	T064 ($C01_{T-1 + T-2 + T-3}$ X T031) + $T062_{T-1 + T-2 + T-3}$ X T063

APPENDIX F - (continued)

Account	Description	Formula
I03	Capital Expenditures	T062
I04	Customer Notes & Accounts Receivable	$\text{T066 X} \frac{(\text{COl}_{T} + \text{COl}_{T-1} + \text{COl}_{T-2})}{} - \text{I04}_{T-1}$
I05	Misc. Accounts Receivable	T067
I06	Inventory	432 + 433
I07	Prepaid Insurance	T068
I08	Interest Payment	$220_{T-1} + 220_{T-2} + 220_{T-3}$
I09	Baton Rouge-Notes & Accts. Rec.	T071
I10	Coraopolis-Notes & Accts. Rec.	T072
I11	McKinney-Notes & Accounts Rec.	T073
I12	Cornwall-Notes & Accounts Rec.	T074
I13	Toluca-Notes & Accounts Rec.	T075
I14	Woodstock-Notes & Accounts Rec.	T076
I15	Total Intercompany Notes & A/R	I09 + I10 + I11 + I12 + I13 + I14
I17	Monsanto - Inter. Notes & A/R	T077
I18	Monsanto - Intra Notes & A/R	T078
I19	Total Inter & Intra Notes & A/R	I17 + I18
I20	Total Notes & A/R	I04 + I19 + I15
I21	Coraopolis - Investment	T079

APPENDIX F - (continued)

Account	Description	Formula
I22	McKinney - Investment	T080
I23	Woodstock - Investment	T081
I24	Toluca - Investment	T082
I25	Nippon - Investment	T083
I26	DIMA - Investment	T084
I27	Baton Rouge - Investment	T085
I28	Total - Investment	I21 + I22 + I23 + I24 + I25 + I26 + I27
I29	Other Uses	T070
I30	Royalty Payment	T032
I31	Total Uses	I01 + I02 + I03 + I04 + I05 + I06 + I07 + I08 + I15 + I19 + I28 + I29 + I30

APPENDIX G

APPENDIX G

FISHER CONTROLS COMPANY
MARSHALLTOWN DIVISION
FINANCIAL MODEL
INPUT MATRIX ACCOUNTS
(BALANCE SHEET)

SUBACCOUNT NUMBER	DESCRIPTION
U001	Beginning Cash Balance
U002	Beginning Dollar Value of Marketable Securities
U003	% of Cash Included in Monsanto Account
U004	Dollar Amount - Other Assets
U005	Beginning Customer & Accounts Receivable Balance
U006	Beginning Balance of Accounts Receivable - Baton Rouge
U007	Beginning Balance of Accounts Receivable - Coraopolis
U008	Beginning Balance of Accounts Receivable - McKinney
U009	Beginning Balance of Accounts Receivable - Cornwall
U010	Beginning Balance of Accounts Receivable - Toluca
U011	Beginning Balance of Accounts Receivable - Woodstock
U012	Beginning Balance of Accounts Receivable - Monsanto - Inter
U013	Beginning Balance of Accounts Receivable - Monsanto - Intra
U014	Beginning Balance of Accounts Receivable - Misc.
U015	Beginning Balance of Inventories
U016	Beginning Balance of Prepaid Expenses - Insurance
U017	Beginning Balance of Prepaid Expenses - Tax
U018	Beginning Balance of Investments - Coraopolis
U019	Beginning Balance of Investments - McKinney
U020	Beginning Balance of Investments - Woodstock
U021	Beginning Balance of Investments - Toluca
U022	Beginning Balance of Investments - Nippon
U023	Beginning Balance of Investments - DIMA
U024	Beginning Balance of Investments - Baton Rouge
U025	Beginning Balance of Property, Plant & Equipment
U026	Beginning Balance of Accumulative Depreciation
U027	Dollar Value of Goodwill
U028	Beginning Balance of Accounts Payable - Trade Creditors
U029	Beginning Balance of Accounts Payable - Commissions
U030	Beginning Balance of Accounts Payable - Group Insurance
U031	Beginning Balance of Accounts Payable - Other
U032	Beginning Balance of Intercompany Accounts Payable - Baton Rouge
U033	Beginning Balance of Intercompany Accounts Payable - Coraopolis
U034	Beginning Balance of Intercompany Accounts Payable - McKinney
U035	Beginning Balance of Intercompany Accounts Payable - Cornwall
U036	Beginning Balance of Intercompany Accounts Payable - Toluca
U037	Beginning Balance of Intercompany Accounts Payable - Woodstock

APPENDIX G - (continued)

SUBACCOUNT NUMBER	DESCRIPTION
U038	Beginning Balance of Accrued Expenses - Salaries & Wages
U039	Beginning Balance of Accrued Expenses - Bonus, Vac., Hol., Pens.
U040	Beginning Balance of Accrued Expenses - Interest Payable
U041	Beginning Balance of Accrued Expenses - Royalties Payable
U042	Beginning Balance of Accrued Expenses - FICA Tax
U043	Beginning Balance of Accrued Expenses - Property Tax
U044	Beginning Balance of Accrued Expenses - Sales & Use Tax
U045	Beginning Balance of Accrued Expenses - Contributions
U046	Dollar Value of Accrued Expenses - Other
U047	Beginning Balance of Accrued Income Tax - Current Federal
U048	% of Total Tax Payments - Current Federal
U049	Beginning Balance of Accrued Income Tax - Current State
U050	% of Total Tax Payments - Current State
U051	Beginning Balance of Accrued Income Tax/Prior Year
U052	% of Total Tax Payments - Prior Year
U053	Beginning Balance of Notes Payable
U054	Beginning Balance of Advances from Parent
U055	Dollar Value of Deferred Taxes & Investment Credit
U056	Dollar Value of Minority Interest
U057	Dollar Value of Common Stock
U058	Dollar Value of Contributed Capital
U059	Beginning Balance of Retained Earnings
U060	Beginning Balance of Inter-Company A/P - Monsanto

APPENDIX H

APPENDIX H

FISHER CONTROLS COMPANY
BALANCE SHEET FORECAST

(Amounts in Thousands)

Account	Description	Formula
	ASSETS:	
	Current Assets:	
A01	Cash	U001
A02	Marketable Securities	U002 - H22
A03	Deposit Account - Monsanto	U003 + H33
A04	Notes & Accounts Receivables	
A05	Customer Notes & A/R	U005 + I04
	Intercompany Notes & A/R	
A06	Baton Rouge	U006 + I09
A07	Coraopolis	U007 + I10
A08	McKinney	U008 + I11
A09	Cornwall	U009 + I12
A10	Toluca	U010 + I13
A11	Woodstock	U011 + I14
A12	Monsanto-Inter	U012 + I17
A13	Monsanto-Intra	U013 + I18
A14	Total Inter & Intra A/R	A06 + A07 + A08 + A09 + A10 + A11 + A12 + A13
A15	Total Notes & A/R	A05 + A14
A16	Misc. A/R	U014 + I05
A17	Inventories	U015 + I06
	Prepaid Expenses:	
A18	Insurance	U016 + I07
A19	Tax	U017
A20	Total Prepaid Expenses	A18 + A19
A21	Total Current Assets	A01 + A02 + A03 + A15 + A16 + A17 + A20
	Investments:	
A22	Coraopolis	U018 + I21
A23	McKinney	U019 + I22
A24	Woodstock	U020 + I23
A25	Toluca	U021 + I24
A26	Nippon	U022 + I25
A27	DIMA	U023 + I26
A28	Baton Rouge	U024 + I27
A29	Total Investment	A22 + A23 + A24 + A25 + A26 + A27 + A28

APPENDIX H - (continued)

Account	Description	Formula
	ASSETS:	
A30	Other Assets	U004
A31	Property, Plant & Equipment	U025 - H23 + I003
A32	Less (Acc. Depr.)	U026 + H03
A33	Net Property, Plant & Equip.	A31 - A32
A34	Goodwill	U027
A35	TOTAL ASSETS	A21 + A29 + A30 + A33 + A34
	LIABILITIES:	
	Current Liabilities:	
	Accounts Payable:	
B01	Trade Creditors	U028 + H18
B02	Commissions	U029 + H19
B03	Group Insurance	U030 + H20
B04	Other	U031 + H21
B05	Total Accounts Payable	B01 + B02 + B03 + B04
	Intercompany A/P:	
B06	Baton Rouge	U032 + H24
B07	Coraopolis	U033 + H25
B08	McKinney	U034 + H26
B09	Cornwall	U035 + H27
B10	Toluca	U036 + H28
B11	Woodstock	U037 + H29
B12	Monsanto	U060 + H30
B13	Total Intercompany A/P	B06 + B07 + B08 + B09 + B10 + B11 + B12
	Accrued Expenses:	
B14	Salaries & Wages	U038 + H05
B15	Bonus, Vac., Hol., & Pension	U039 + H08
B16	Interest Payable	U040 + H09
B17	Royalty Payable	U041 + H17 - I30
B18	FICA Tax	U042 + H12
B19	Property Tax	U043 + H15
B20	Sales & Use Tax	U044 + H16
B21	Contribution	U045 + H10
B22	Other	U046
B23	Total Accrued Expenses	B14 + B15 + B16 + B17 + B18 + B19 + B20 + B21 + B22
B24	Acc. Inc. Tax/Current Federal	U047 + C053 + I01 + T058 + T061
B25	Acc. Inc. Tax/Current State	U049 - T061
B26	Acc. Inc. Tax/Prior Year	U051 - T058

APPENDIX H - (continued)

Account	Description	Formula
B27	Total Current Liabilities	B05 + B13 + B23 + B24 + B25 + B26
B28	Notes Payable	U053
B29	Advance From Parent	U054
B30	Deferred Taxes & Inv. Credit	U055
B31	TOTAL LIABILITIES	B27 + B28 + B29 + B30
B32	Minority Interest	U056
B33	Equity:	
B34	Common Stock	U057
B35	Contributed Capital	U058
B36	Retained Earnings	U059 + C55
B37	Total Equity	B34 + B35 + B36
B38	TOTAL LIABILITIES & EQUITY	B31 + B32 + B37